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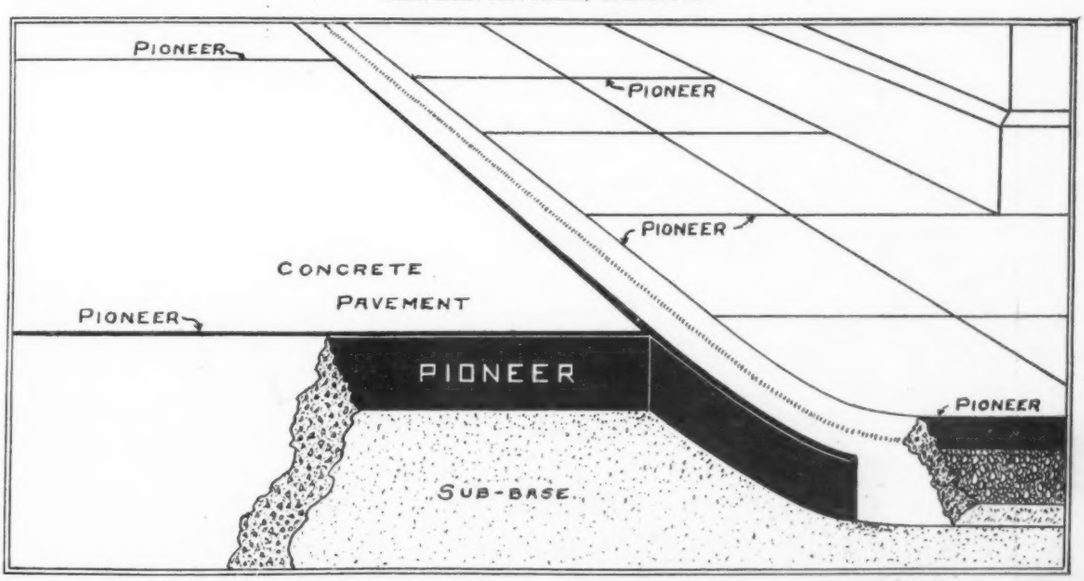

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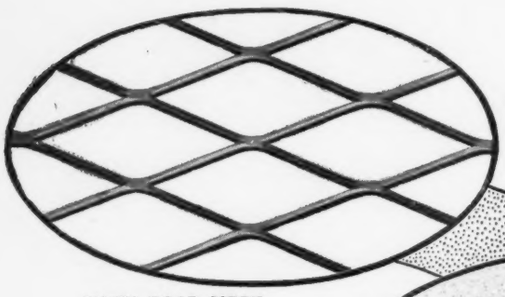

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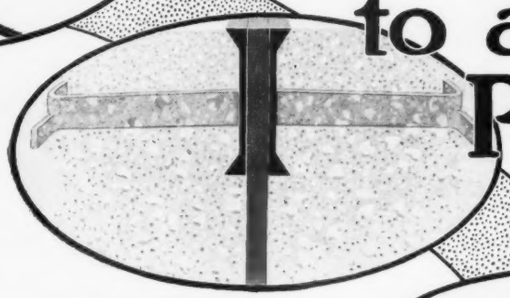

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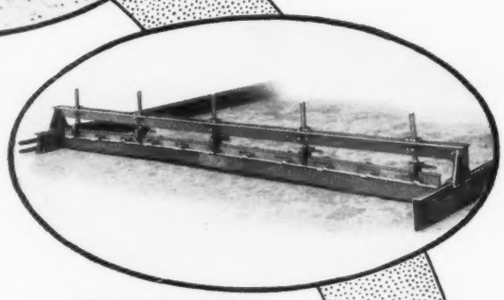

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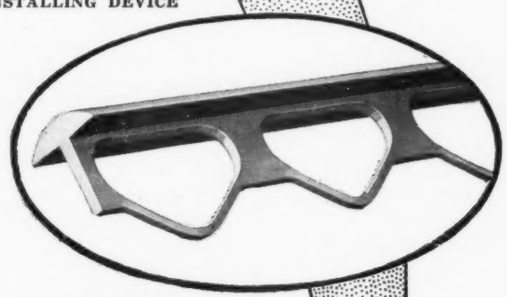

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Municipal Journal

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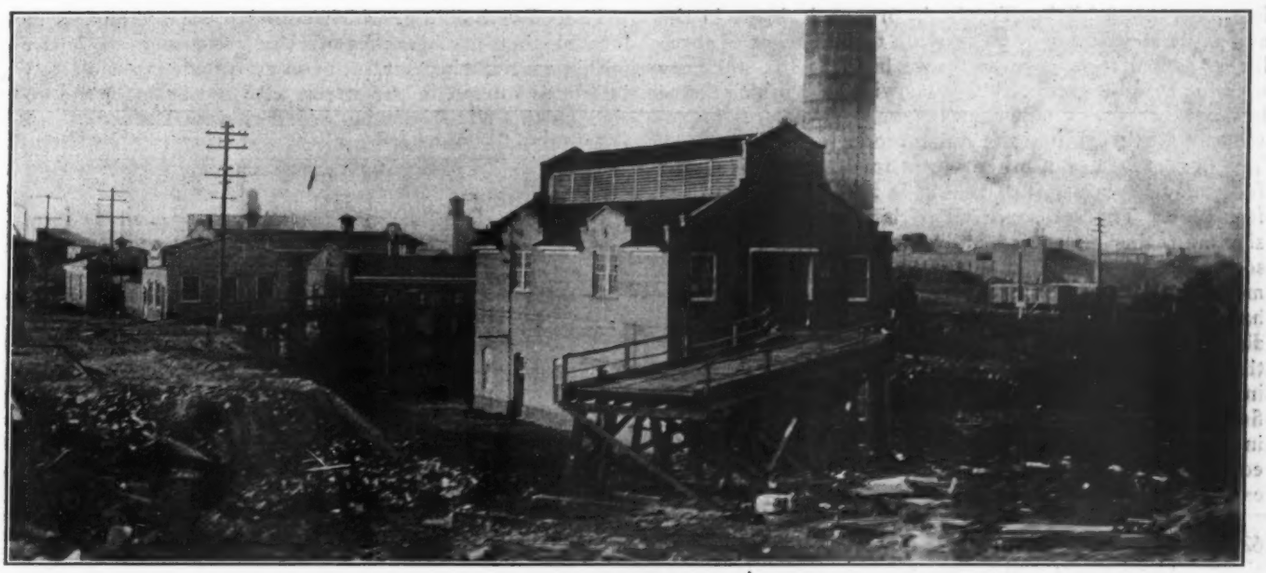
RECONSTRUCTION OF SPOKANE INCINERATOR

Three Forty-Ton Units Moved to a New Site, and New Modern Stable, Repair Shop, Garage and Other Buildings Constructed—Method of Raising Funds for New Buildings.

By ARTHUR E. PETERSON.*



VIEW OF INCINERATOR GROUP FROM THE SOUTHEAST.
Incinerator in foreground, office and shop at rear of incinerator.

Note: The Spokane incinerator, its operation, and the collection of refuse by the city were described by Mr. Peterson in an article that appeared in the issue of Municipal Journal for February 13th, 1913. The incinerator consisted of three 40-ton units built in 1908. This incinerator has now been moved to a new site, as described below.

Waste disposal by incineration has been resumed recently in Spokane. The crematory plant was closed down for practically three months during the erection of new buildings and renovation of the furnaces. The original sheet steel crematory building has been completely dismantled and the new structures of steel, concrete and brick have been completed.

During the shutdown the furnaces were removed to the new crematory building and overhauled. The work of modernizing the furnaces was done by the Decarie Incinerator Company of Minneapolis, which made the original installation. The interior arrangement of the furnaces has been altered in accordance with the latest practice of the company. It has been demonstrated in the tests made that the efficiency of the furnaces has been greatly increased. Both our labor and fuel costs have been reduced. We have not had occasion to charge the furnaces to their maximum, therefore we are unable to indicate what will be the minimum cost per ton for disposal.

The building in which the furnaces are housed contains modern toilet, shower and locker facilities. It is well lighted, having an ample number of windows of large size. There is an entire absence of obnoxious odors in or about the building. The walls and floors are waterproofed, therefore the entire building may be cleansed by flushing whenever necessary.

The three furnaces were formerly set in line lengthwise of the old building. This occasioned a loss of time in unloading trucks, because of the fact that we were unable to unload in the middle furnace when unloading into the furnaces on each end. We have in the new plant offset the middle furnace about six feet. With this arrangement we may unload into all furnaces at the same time without interfering with the movement of wagons or trucks on the same unloading floor.

The horses used in waste collection work have been removed from an old wind-racked frame barn to a modern brick stable. The stable contains a lounging and locker room, and is completely equipped with toilet and lavatory and heating system. The upper portion of the stable is utilized as sleeping quarters for the stable attendant, and for storage. The stabling quarters have stalls for eighteen horses and a box stall. The stable is well lighted and ventilated. The concrete water troughs have hot and cold water available. The concrete floor and the walls are waterproofed. The floor is pitched to four catch-basins. The stalls have false floors of wood, all the boards of which are spaced one-half-inch apart for drainage. The floors are hinged so that they may be

*Superintendent of Crematory Division, Dept. of Public Affairs, Spokane, Wash.

OFFICE AND INCINERATOR BUILDING.

raised and thoroughly flushed at regular intervals. The wood floor is pitched only one inch to ten feet, which allows the animals to assume a practically natural position while standing in the stalls and eliminates the many results of constant strain of standing on a floor which has too great a pitch. To obtain proper drainage in the stalls, the concrete floor has a pitch to the gutter of three inches to ten feet. The partitions between the stalls are built of two by six-inch material with a two-inch space between boards, by which means we secure a free movement of air throughout the stable room. The horses face each other with a four foot alley between. The ceiling is ten feet high. The stalls are all of large size and the air space allowance is somewhat greater than suggested by most authorities. Since our horses have been well housed we have been able to reduce their feed ration and there has been a general improvement in the health of the animals. When we find that we can use additional autos in our work the stable may be converted into a garage with a nominal expense.

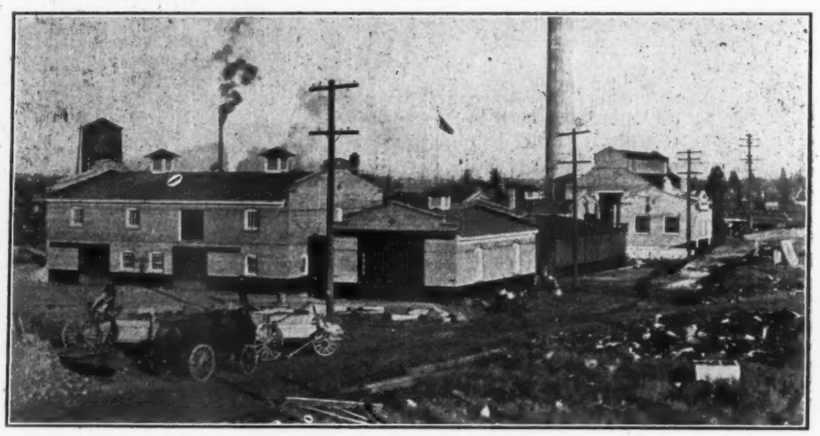
The stable building is rectangular, 62 ft. 2 in. by 42 ft. 2 in. outside dimensions. The lockers and toilets extend across one end of the ground floor, all the rest being in one large room 50 by 40 ft. A 4-ft. passage or alley runs lengthwise of this through the middle, and a cross passage 5 ft. wide crosses it 20 ft. from one end. On each side of the alley are nine stalls with their mangers next to the alley, each stall being 5 ft. wide center to center of partitions and 10 ft. long over all. Along each side of the building is a passage 8 ft. wide between the outside wall and the rears of the stalls. Two 8-ft. doors in the outer wall open onto each passage. In each passage, against the wall, is a concrete water trough 8 ft. long by 18 in. wide. In the alley are two grain boxes with hinged lids, connected with the bin by a 6 by 6-inch chute.

In each side wall are two 3 ft. 8 in. windows lighting the stable and one 3-ft. window lighting the toilet and locker rooms, and in the end occupied by these rooms are four more 3-ft. windows. The other end wall is blank. Each stall partition consists of a 6 by 6-inch post at each end, slotted to receive the 2-inch partition planks. The floor is concrete throughout, with a false floor of wood as described elsewhere.

The repair shop is a daylight shop, equipped to repair autos and wagons and to do all shoeing necessary. There is room in the shop for two trucks and three horses at one time.

The garage building, which is waterproofed, has an overhead water system, a heating system connected with the stable system, and a catch-basin in the centre of the floor.

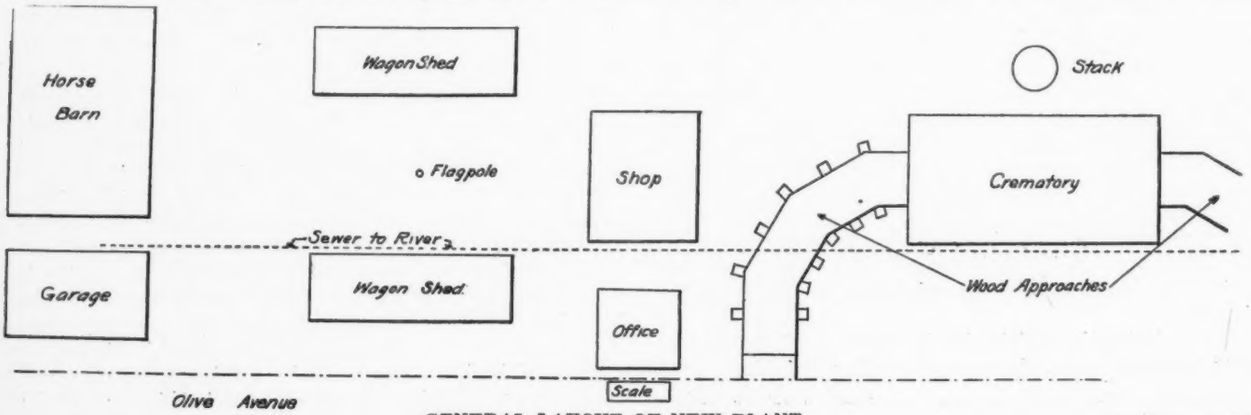
The office building, which completes the group, is so located that all branches of the crematory work are within easy reach. A fifteen-ton auto scale is set directly in front of office, in the street, with the beam in the office at the elbow of the order clerk. The office has eleven-foot ceilings, large windows and spacious desk room. Hot and cold water, a drinking fountain, lavatory and toilet complete the appointments in the office. The building has a full basement, which is used for stores.



STABLE AND GARAGE IN FOREGROUND, WAGON SHED AT REAR OF GARAGE.
Since this was taken rubbish has been removed and road graded.

Mr. Duncan, superintendent of parks, is working on plans for the parking of the crematory grounds and will supervise the work of beautification in the spring.

The crematory group now consists of five modern buildings of pleasing design and practical arrangement, two wagon sheds of steel and wood construction with



GENERAL LAYOUT OF NEW PLANT.

space enough for all crematory equipment, and a 207-foot stack of Weber conical design. The Spokane waste collection and disposal equipment will now compare very favorably with that of any municipality in the United States and the total cost to the city for the improvement has been a little less than $5,000.

The manner in which the funds necessary were secured to erect the buildings will form an interesting paragraph in the municipal history of Spokane. A local railroad company owns land which completely surrounds the crematory property. This land is distinctly yard property, therefore the crematory nestling in their centre did not enhance the value of their holdings. A swap was suggested. Terms were agreed upon and a trade made. Under the terms of the deal the city turned over to the railroad its crematory site and received in return an equal amount of land, slightly nearer to the centre of the city, a thirty-foot roadway extending for almost one half mile and a moving bonus of $30,000. Of this amount $5,000 was turned over to the asphalt division toward the expense of moving and remodelling the asphalt plant. The balance has been used in the completion of the crematory group. When the proposition of moving was originally decided upon it was planned to utilize some of the old buildings used in the crematory work. After the improvements planned were well begun the incongruity of the old tumble-down buildings—which were a civic disgrace—grouped with the modern brick structures was readily apparent. Therefore the old buildings were all razed and the complete set of new buildings has been erected. This entailed an additional expense of $5,000, which was met by the city.

NOTES ON BRICK PAVING

Outfits and Methods Used in Constructing Monolithic and Sand Cushion Pavements—Applying Asphalt Filler to Close Joints.

The following notes regarding methods of constructing brick pavements as used by various contractors and engineers were gathered from observations made during the past season. Some of them give valuable pointers and some of them tend to show why perfect brick pavements are not always seen.

A MONOLITHIC BRICK PAVEMENT.

The first photograph shows the layout for constructing a street in a city under the three-mile road law of Indiana, the work being done by the county and paid for by the issue of bonds of the township in which the city is located. The pavement is 20 feet wide on each side of the single street railway track in the center. The pavement on one side of this track was completed before the other was begun.

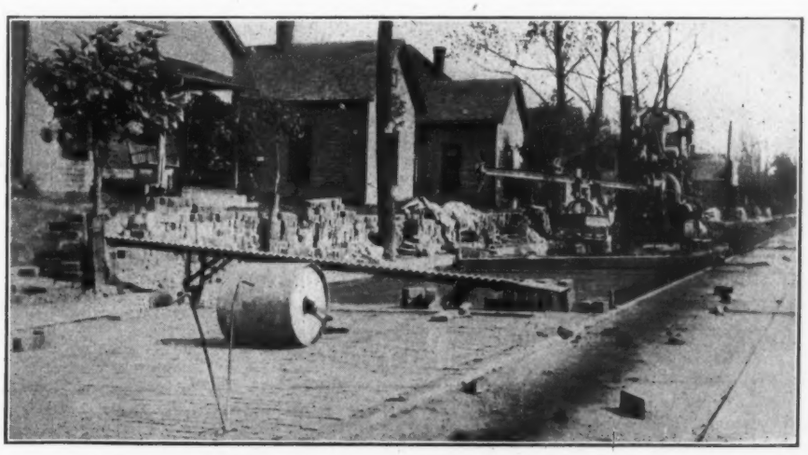
The machinery used included a road grader for shaping the subgrade between the curb and the street railway track, the pavement being laid without break from curb to rail; an Erie roller for compacting the subgrade; the Koehring mixer seen in the photograph; a home-made box drag for shaping and compacting the fine gravel (seen in the second photograph), which was drawn forward by the ropes shown; a form for smoothing off the surface for laying brick, seen in the same photograph alongside the box concrete shaper; a Mathews gravity carrier, and a hand roller for rolling brick.

Concete curb, half-inch Elastite joint along the curb and a nearly plane surface with cross slope enough for drainage are according to standard.

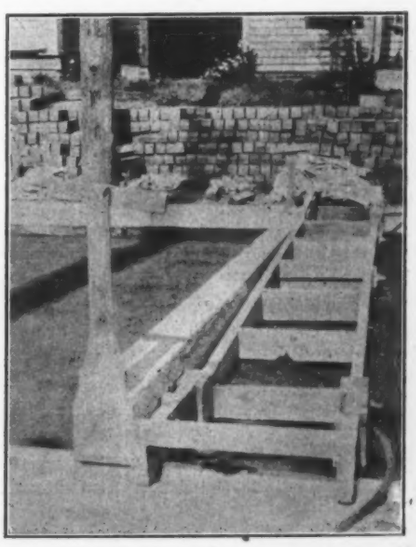
The most noticeable departure from standard practice was the concrete. This was made of a very fine gravel, largely coarse sand, which was obtained from an excavation on some vacant lots alongside the street, so that delivery as well as material was secured at the lowest possible cost for wagon haul and hand shoveling. The concrete was deposited presumably 5 inches thick (but not very accurately so) by the mixer's traveling bucket, some of it being deposited in the boxes of the shaper so that all depressions in the surface should be filled. The surface was further compacted by the straight-edge or form mentioned and is smoothed off still more by hand luting when necessary.

On this smooth surface of the concrete the bricks were laid and after inspecting, turning and replacing rejected brick, and rolling, the cement grout filler was applied. The concrete was so fine-grained and its finished surface so smooth that the usual dry cement-and-sand layer was not required.

One question that arose was as to the strength of concrete which is so nearly a cement mortar, although the proportions seemed to be such as to produce a dense concrete which hardened into a compact mass. Another question was as to the sufficiency of the cement grout to produce a monolithic pavement. The sand for this grout was produced by sifting the gravel in the pit through a



OUTFIT FOR LAYING MONOLITHIC BRICK PAVEMENT.
Road grader, heavy roller, hand roller, concrete mixer, smoothing form, and gravity carrier.



BOX DRAG FOR SHAPING AND COMPACTING CONCRETE.
Also form for smoothing surface for laying brick.

vertical wire screen with long spaces between the stretched wires by throwing the fine material against it. There was so much dirt in the resulting sand that each batch of grout as dumped from the box showed several lumps of mud rolling over the surface of the bricks and the grout was dumped from the box in one mass without shoveling or distributing except as the water in the mass carried the cement, sand and mud over the surface or into the joints.

Wire-cut lug bricks were used, but this method of grouting will probably not give them their full value in the pavement. The gravity carrier carried bricks to the outer side of the pavement, where they were laid in piles by a couple of boys. The piles near the gutter were made by men handling the bricks directly from the large piles along the curb to the small piles in threes along the edge of the laid bricks. Little care was taken to lay the lugs in the piles uniformly in the same direction and not much more care in laying them straight in the pavement. The Brazil blocks used were very uniform and smooth and almost all the turning of bricks in the inspection was for the purpose of putting the lugs on the right side. Even then, perhaps ten per cent of the bricks still had the lugs on the wrong side. It is so easy to lay the lugs on the right side that there is little excuse for this waste of time and for the remaining defects. However, the contracting firm doing the work seems to be successful and has a large amount of work each season which is acceptable to the engineers and commissioners in charge.

A STANDARD BRICK STREET.

In Muncie, Indiana, a three-mile road contract for brick pavement was let under the standard specification for cement grout filler and 2-inch sand cushion. The concrete specification calls for 1 cement, 3 sand, and 5 broken stone, but the sand used is practically the same as that used for the whole concrete job just described, so that the proportions actually used are 1 of cement, 4 of the gravelly sand and 4 of the broken stone. There is a 2-foot gutter (combined curb and gutter) and a ¾-inch Elastite expansion joint along each curb, the pavement being about 40 feet wide with no car track.

The contractors, W. M. Burch & Co., are quite well supplied with machinery. A Thew automatic shovel takes out the grade almost exactly to cross section and the grade is finished with a Champion finishing grader, horse drawn. A Koehring self-propelling gasoline concrete mixer places the foundation. Two Mathews gravity carriers transfer the bricks from curb piles to street, one working from each curb, and the bricks are piled so as to make it easy to lay the wire-cut lugs all on the same side. A large horse roller is used on the sub-grade and a small hand roller on the brick surface. A Rex chain-belt grout mixer drops the mixed grout into the joints in the best manner possible.

As has happened frequently this summer, largely on account of difficulties in transportation, several kinds of bricks have been used on the contract and those latest received were very irregular in shape and many of them were marked for turning, with a rather large proportion of rejections. This is one of the difficulties peculiar to seasons like the present, which under ordinary conditions it is easy to prevent.

APPLYING ASPHALT FILLER.

On contracts in Bloomington, Ill., the difficulty with delivery of brick was so great that, although repressed blocks with points for lugs were specified, the contracts were finished, after two changes during the season, with plain Springfield wire-cut blocks. The question with these blocks was as to the possibility of filling the narrow joints between the blocks, as laid close together, with the specified asphalt filler. The city engineer, E. H. Packard, after some experiments, decided that it could be done by using the Warren apparatus for applying the seal coat to bitulithic pavements. This consists of a wheeled box with a plugged hole in one corner and a curved rubber squeegee which draws over the pavement the asphalt let out of the hole ahead of it, the concave curve concentrating the asphalt rather than distributing it. The bricks were so smooth and so smoothly laid that a very thin skim of the asphalt was left on the surface and the asphalt was heated so hot and applied so rapidly that it thoroughly filled the joints from top to bottom.

The experiments showed that the asphalt, when hot enough, ran several inches either way from the point of application and that there was no difficulty in securing complete filling. Time studies showed that a bucketful of hot asphalt, about three gallons, would be applied in about 5½ minutes when poured by hand from cans into the joints, accompanied by considerable spilling over and requiring the squeegee over the surface; while the same amount would be applied by the Warren machine in 35 seconds and less would remain on the surface, especially in cold weather, as the 5½ minutes and the squeegee give so much more opportunity for cooling of the asphalt and consequent stoppage of flow.

Contractor I. D. Lain used the following method in handling bricks directly from car to street on a late contract for a single block, which had been held up by non-delivery of brick and was all ready for the brick some time before they arrived. The bricks were racked on wagons without sides and with bottoms sloping slightly toward the center so that, with the end gates, the bricks did not fall off in transit. These wagons were hauled over a wooden track laid on top of the newly laid brick nearly to the edge, when the horses were unhitched and the wagon pushed up to the edge by hand. Two men in front piled bricks for laying the middle of the street, two men on each side loaded gravity brick carriers which carried the bricks to the quarters, where two men for each carrier took them off and piled them for the layers. One extra man, 2 layers, one man to look after the extra wagon, water boy and foreman and 3 men spreading sand ahead of the laying completed the gang.

Presumably the wagon would be rolled back on the board tracks before the new wagon was driven in, but the unloaders were idle during much of this process, so it was very easy to run the empty wagon to one side so that the team unhitched from the loaded wagon could be turned round to the unloaded wagon, hitched up and driven off over the bricks. This doubtless left the surface somewhat uneven, although it was thoroughly rolled before filling. One result of this was a little more asphalt spread on the surface to fill the low spots partially.

The boards for the wagon tracks were bound at each end with a wide strip of galvanized iron so that they would not split under the heavily loaded wagon wheels. Enough boards were used for the double length of the block.

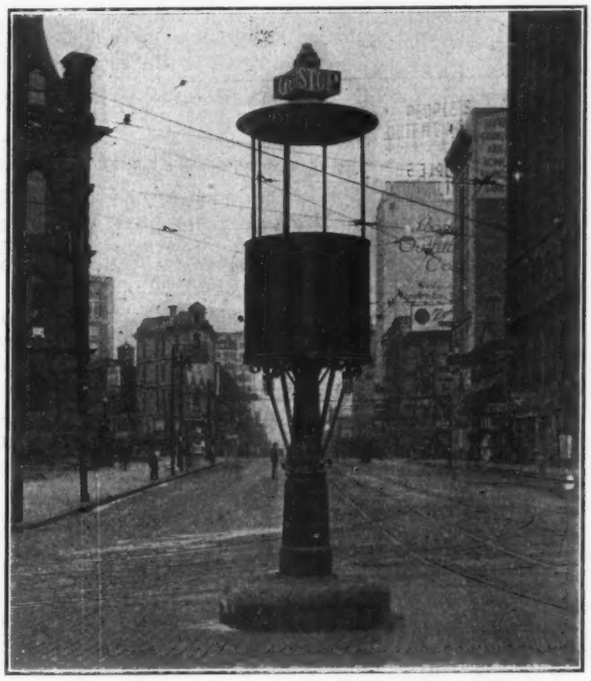
CROW'S NEST TRAFFIC SIGNAL.

A traffic count made recently by the Detroit Police Department at the point shown in the illustration, where six streets converge, gave about 20,000 as the number of vehicles that cross this intersection in ten hours. It is claimed that in no other American city, not even in New York, is there an intersection where the amount of traffic exceeds this.

At this point the city has erected an elevated box for the traffic officer. This signal box raises the traffic officer out of danger from the traffic and also gives him a more extensive view, thus enabling him to control the traffic

to better advantage. Also, from this box he signals eight other traffic officers stationed within a few hundred feet out the converging streets.

The base of the tower is of concrete and the superstructure of steel. The box or "crow's nest" is round and elevated 6 feet above the ground. Above it, and



CROW'S NEST TRAFFIC SIGNAL, DETROIT.

operated in the regular way, are the customary "stop" and "go" signs and the red and green lights used for controlling the movement of traffic.

MODERN GRANITE BLOCK PAVEMENTS

Most Satisfactory Materials for Filler and Methods of Mixing and Applying Same—Sand and Sand-Cement Cushions—Shallow Blocks.

In a paper before the American Association for the Advancement of Science, Clarence D. Pollock described the characteristics of the best granite block pavements as now laid. Most of these are familiar to all who have kept informed in paving matters, but some of the later developments in filler and cushion practices may be noted.

Cement grout filler is preferred if traffic can be kept off the new pavement a long enough time to permit it to set thoroughly. This should be mixed one part Portland cement to one part of even-grained, fine sand—one that will pass a 20-mesh sieve if this is not too expensive. The finer and more even the sand particles, the better they will remain in suspension and the more uniform the filler. Machine mixing is advised.

If a bituminous filler is used, the best practice is to mix a fine, hot sand with it before pouring, between 70 per cent and 100 per cent (by volume) as much sand as bitumen being used. A straight coal tar pitch is too susceptible to temperature changes to be used in this climate, but a mixture of one part asphalt with five parts of coal tar pitch gives good results, as does asphalt alone. The hot sand and bituminous material should be mixed and at once drawn off into wheelbarrows or the like, dumped at once upon the pavement and worked into the joints until they are thoroughly filled. When the filler stands up flush with the surface of the blocks, a small amount of sand should be spread over the surface, which will prevent the tar adhering to wheels and help to harden the surface of the filler. Brooklyn, N. Y., uses one part refined residual asphalt to five parts coal tar pitch, and Manhattan borough uses asphalt cement; not to exceed one part of sand being added to one part of the bitumen in each case. The mixing is done with a rake or a perforated hoe.

The cushion may be sand not more than one inch thick, or a dry mixture of one part cement to four of sand. The latter costs about 15 cents per square yard more, but is probably advisable where the traffic warrants it. It does not seem advisable to use the cement when bituminous filler is used, for in the latter case the cement can not set until after traffic is allowed on the pavement and so fails to bind the blocks to the foundation. It is claimed that the cement prevents the cushion from washing if water finds its way into it, but if the joint filler be properly placed there will be no danger of such washing occurring.

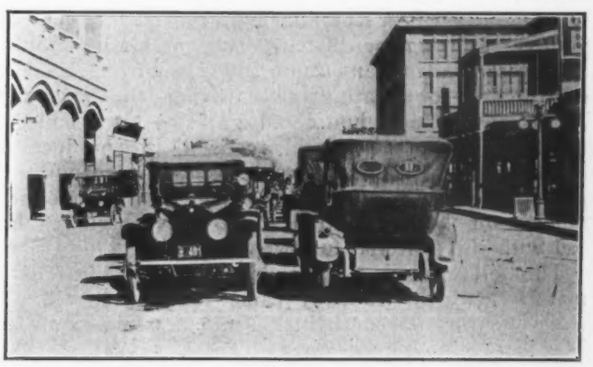
Concerning the use of blocks shallower than 5 inches, Mr. Pollock says:

"It is sometimes necessary, because of freight charges, etc., to use shallow blocks, or else use a pavement which is less durable than granite blocks. This condition is more likely to prevail on road work and in inland cities where there is a rail haul.

"Then there is another condition which requires a shallow block, and that is where the traffic conditions have changed so much that it is necessary to use granite to replace a lighter material, and yet it is desired to utilize the old concrete foundation. For such a condition a resurfacing block is made which has a depth of 3½ to 4 inches. It is preferable to lay such a block upon a cement mortar cushion, especially if the traffic is heavy."

STREET PARKING OF AUTOMOBILES.

In the streets of Phoenix, Arizona, the congestion and other objectionable features caused by motor cars standing along the curb for hours at a time finally led to the adoption of the present parking system. By this system, instead of allowing cars to park at the curb, where they interfered with traffic and kept the store entrances crowded, the city manager directed that parking places be outlined in the middle of certain streets where there are no car tracks to interfere. Broad bands of white paint marked off standing room for the automobiles, and each



PARKING CARS IN CENTER OF STREET.

machine was required to line up inside one of the squares so designated if it was to be left for more than twenty minutes in the street.

Ample room is provided for running the cars in and out, and backing is not permitted. To take care of the

machines for hire, spaces at each corner are reserved and each driver has his own stand.

Double lines of cars facing with the traffic are found on the narrower streets, but on the wider thoroughfares the machines are parked at right angles to the traffic.

This system has been tested long enough to prove that it is a success. The traffic lanes are kept open and are separated by the lines of standing cars; the curbs are not encumbered with idle machines, though alighting at the curb is permitted, and the merchants are satisfied because the way to their stores is always open. Either shoppers or delivery men can always approach the places of business, which in the past were usually blockaded by standing machines.

UTILIZING WASTE IN LIVERPOOL

Garbage Cooked and Fed to Pigs and Poultry—Bones, Antique Eggs, Banana Stalks, Fish, Oyster Shells, Straw and Other Wastes Utilized.

In a paper read last October before the Institute of Cleansing Superintendents in England, John J. Beckett, superintendent of cleansing of Liverpool, describes some of the new practices of that city in the collecting and disposing of the city's refuse, and especially the waste food.

In addition to the markets and other sources of animal and vegetable waste matters, Liverpool contains large numbers of cold-storage and warehouses where are received and temporarily stored food received from over seas, chiefly from America. Owing to delays and other causes, more or less of this is received in a stale or damaged condition and has to be disposed of. In the general effort to eliminate all waste during the war, it was decided to make special efforts to put this food matter to some use. A special and separate collection from all retail fish and greengrocers' shops was inaugurated, and all house-holders were urged to separate their garbage from the other refuse (which has not been the practice in England), the city supplying for receiving the domestic garbage small tin cans in which oil is sent to that country from abroad. Thousands of these empty cans were obtained by the city authorities and cleaned and painted, their total cost being less than 25c.

At the suggestion of the city engineer, John A. Brodie, experiments were made in preparing and cooking the material, the product to be used for feeding pigs and poultry; utilizing for this purpose some old pitch boilers that were available and using the steam from the refuse destructors for heating and driving the machinery. Abattoir offal and household garbage were boiled in these and, when thoroughly cooked, the product was taken while hot by motor wagons to the corporation's piggeries, where about 200 pigs and a large amount of poultry on the corporation's farms have been regularly fed with this material for twelve months.

The following is a short description of some of the materials which gradually came to be prepared after experimenting for some litttle time on a small scale:

Bone Meal.—All bones are collected, washed, boiled, fat extracted, and ground.

Egg Meal.—Damaged eggs are frequently received in large numbers. One consignment dealt with a few weeks ago reached a quarter of a million. These eggs are boiled, chopped, dried, and ground into meal, forming an excellent chicken food.

Ash Fertilizer.—A small furnace has been erected to burn all light material, such as soiled paper and straw, old wooden boxes, etc., the resultant ash being a fertilizer containing about 12 per cent of potash.

Dried Vegetables.—Cabbage leaves, of which we receive large quantities, have been dried and stored, and found very useful as a poultry food.

Banana Stalks.—In the early days of the war large quantities of these stalks were being removed by us, and after experimenting we found that by scientific treatment a considerable quantity of potash could be obtained and used for soap-making purposes.

Fish Fertilizer.—Where the fish is found to be in a bad condition it is immediately made into fertilizer by drying quickly at great heat.

Charcoal.—All old wood refuse heated at a low temperature to permit of carbonisation.

Oyster Shells.—Washed, calcined and ground, find ready sale to poultry feeders.

Chopped Straw.—All clean straw from packing, etc., is gathered and chopped and sold as a very good scratching material for poultry sheds.

From the experience already gained there can be no doubt that work in this direction has been attended with very beneficial results, particularly in assisting to raise poultry in the production of eggs and in the feeding of pigs and rabbits for slaughter.

This experiment was so successful that a regular reduction plant was installed, which Mr. Beckett described at some length, this type of plant being novel in England. In brief, it consisted of a digester, a drier, a vacuum pump for removing objectionable gases, a disintegrator, and skimming tank for removing fats. Steam was used in cooking. The amount of greases and tankage recovered was not stated. Heretofore it has been considered that English garbage contained too little grease or other waste food materials to make it profitable to endeavor to recover them in this way, and it is to be presumed that during the war the garbage is even less rich than formerly. The grease is sold at "an exceptionally high price," and the tankage is used for poultry food in proportion of 10 per cent of the whole food and is sold at $75 or $80 a ton. Apparently meat and fish are digested separately, for the author states that, making a comparison on a basis of percentage of albuminoids and phosphates, the meat meal has a value 2½ times as great as barley meal, while the fish meal is nearly twice as rich as barley.

In addition, the city has found that, by keeping the garbage out of the ashes and other refuse, the latter can be sorted and picked over to better advantage and the city is now recovering from the dry refuse a considerable quantity of waste paper, rags, string, old bagging, bottles, glass, tin, galvanized iron and enamelware.

WOOD BLOCK PAVING IN BALTIMORE

Methods and Care Used Prevent Bulging—Tar or Asphaltic Filler—Sand Used for Lug Block Joints.

Although wood block paving is not extensively used in Baltimore, Md., there are several streets so paved. Nearly all of these contain street car tracks. Conduit and manhole covers in the street surfaces are of various shapes, including circular and octagonal, the latter of which are not easy to fit block pavements to, but wood blocks can probably be adjusted to them more readily than any other kind of block.

Very little trouble is reported from the bulging of wood block pavements in Baltimore, which is probably due largely to the methods and care employed in laying them. The specifications provide that the same kind of timber shall be used throughout each contract. a list of acceptable timbers being given, although yellow pine is that most commonly used. Yellow pine blocks must have not less than 50 per cent heart wood and must average 80 per cent, and there must be an average of at least 6 annual rings to the inch, radial measurement, no block contain-

ing less than 4. Blocks must not vary more than ⅛ inch in depth or 1/16 inch in width. They are treated with 18 lbs. per cubic foot of a coal tar product free from adulteration, of 1.08 to 1.14 specific gravity, and must show satisfactory penetration. On most of the streets laid so far, plain rectangular blocks have been used, set loosely together on a sand-cement bed, with joints not exceeding ⅛ inch. An exception is German street, constructed in 1915, which contains two car tracks, although the roadway is not more than 35 feet wide. This was laid with Kreolite lug wood blocks, laid as closely as the lugs permit. The two lugs on one side of each block are somewhat circular in form and the one lug on one end of each block is nearly triangular; all lugs being about ⅛ inch high and ¼ across the base.

For filling the joints, the specifications usually provide for a tar or asphaltic filler. For the lug wood block pavement the specifications provided that, after the blocks had been thoroughly rolled, enough fine, hot and dry sand should be spread on the surface and swept into the joints to fill the spaces between the blocks for a depth of about 2½ inches, all sand to be broomed out of joints to a depth of at least ½ inch below the surface. The joints were then squeegeed full of an asphaltic filler containing 99 per cent pure bitumen, 13 penetration at 32° Fahrenheit, 250 at 115°, and 40 to 66 at 77°; with a ductility of 20 cm. or more at 77°. It was provided that the filler should be thoroughly squeegeed in and the tops of the blocks left clean enough to show the grain or rings of the wood. The surface was then covered with coarse sand.

When observed in hot weather when about two years old, this street showed no indication of undue expansion or bulging, the only trouble reported by the engineer being a slight bulging in the wing of an alley intersection where the pavement had not been properly laid. This was corrected and there has been no trouble since. As stated before, bulging troubles have not been experienced in any of the wood block pavements in Baltimore, except occasional instances as that just referred to.

One reason for the absence of bulging troubles seems to be that the pavement has an almost straight cross-section from the curb to car track, the crown being too slight to cause much tendency of arching of the pavement under the stress of swelling blocks. In laying blocks, it seems to be the custom to lay them when they are their maximum size. When cement filler is to be used, the specifications require that the blocks be kept free from dirt and sand and kept wet for four successive days after rolling before the grout filler is applied. In hot weather, particularly, the streets are flushed by use of Kindling squeegees or are sprinkled and swept at night, and about twice a day the street is sprinkled by a sprinkling car run on the street. There is ordinarily, therefore, little opportunity for the blocks to dry out and the water or oil in them to evaporate..

On the lug-block street the blocks have swollen somewhat lengthwise of the blocks (crosswise of the street) but the lugs have either crushed or indented the adjoining blocks so that any motion due to swelling has been confined to the depth of these lugs in each joint. The swelling of individual blocks lengthwise of the street is not so great as that crosswise, because the width is only one-half or one-third the length of the block and there are two or three times as many joints to take up this swelling. The sand in the lower part of the joint is practically incompressible, so that at the bottom the joints probably are not reduced in width; but there is frequently evidence of some compression of the joint filler and also of the lugs at the top, or rather of indentation of the adjoining blocks by the lugs. (This relative incompressibility of the bottom of the joint probably assists greatly in preventing the lifting or bulging of the blocks.)

The hot sun seemed to expand the filler somewhat so that it projected slightly from the joints that had been exposed to the sun. This projection was sometimes high enough to cause the filler material to be spread over the top of the blocks. This effect was observed on both the side and end joints. There was a considerable amount of bituminous material on the top of the pavement, even where the traffic was heaviest, outside the line where automobiles were allowed to stand along the curb. This indicated either that a considerable amount of bitumen had been left on the street when it was built or that the expansion of the filler by heat and its subsequent spreading over the surface is still continuing. There was no evidence of bleeding of the blocks and the asphaltic filler gave no trouble from sticking to tires or shoes, even when bubbles of air expanded and, when they were burst by pressure, threw drops of clear bitumen out onto the surface.

MUNICIPAL ENGINEERING AND THE WAR

Experiences of English Cities at the Beginning of the War—Road Wear Intensified—Sewerage and Water Supply.

One of the most prominent of England's municipal engineers, H. Percy Boulnois, a few weeks ago delivered a lecture before municipal engineering students in which he discussed at some length the effect of the war on municipal engineering and public health. After calling attention to the extent to which all cities depend upon municipal engineers for roadways well maintained, clean and lighted, abundance of pure water, removal of sewage and other waste products, the supply of gas, electricity, parks, public baths and numerous other conveniences and pleasures, he referred to the demand after the outbreak of the war for the discontinuance of every expenditure for which there was not some absolute necessity.

This introduced several difficult questions, among them the following: (1) At what stage could the works be closed down so as to leave them in a condition that would not be detrimental to them if left in this state indefinitely? (2) How was the financial position of the contractor to be met with regard to his possible profits if he had been allowed to complete the scheme? (3) Was the contract to be altogether broken, or could some arrangement be made under which the contractor could continue his contract on the resumption of normal times if he so desired? (4) What was the position of the consulting engineer, if there was one, under his agreement with the local authority? (5) Would the closing down of the works have any effect on the question of public health? There were further complications, such as what disposition to make of the contractors' plants and of materials which had been delivered on the works or ordered from the manufacturers.

Shortly afterward another difficulty confronted the municipal engineers, in that at least 600 of them either joined the army or entered national service, many of them in the roads battalion at the front or the sanitary companies either there or at home, throwing additional burdens on those remaining.

One of the most difficult problems was that occasioned by the destruction of the roads because of the enormous increase in motor traffic. "Weights are now being carried on our roads which would not be allowed in times of peace. . . . The difficulty of maintaining the roads has been greatly accentuated by shortage of labor and

materials and the increased cost of both. The municipal engineer has been sorely tried, but in most cases he has risen to the occasion and by judicious patching on the stitch-in-time principle, and by the more universal application of tar or a bituminous compound to the surfaces of the ordinary water-bound macadam roads, he has been able to maintain his roads in a fair condition, notwithstanding the above drawbacks. What is to happen to the roads, however, if the war continues much longer is a difficult problem, for when once a road has 'foundered' it is an arduous and costly job to reinstate it.

"With regard to the effect on public health by the stopping of monetary grants for road purposes, there can be little doubt that a bad road is an insanitary road, especially in the case of streets with dwelling houses abutting thereon, as mud and dust are both detrimental to the public health." Street cleaning he considers very necessary to public health, and in this work the employment of women scavengers and the introduction of self-propelled sweepers and scrapers has greatly reduced the necessity for the employment of men and horses. He considers it regrettable that shopkeepers and the general public do not assist in keeping the streets cleaner by exercising more care in the way they dispose of their waste paper and rubbish of all kinds.

One effect of the war has been to greatly increase the value of certain materials that are found in municipal refuse. "The value of such articles as old bottles, glass, paper, rags, tins, iron, coal, and numerous other materials found in house refuse, has gone up by leaps and bounds and consequently the municipal engineer is now considering how these articles may be turned to profitable account instead of being wasted." One small district of 20,000 inhabitants let for $200 a year the right of removing bottles alone from its municipal waste. Edinborough last year sold its waste refuse for $11,000. In view of the existing difficulty in obtaining sufficient fertilizers and the urgent demand for the production of more food products, the saving of fertilizing materials in such wastes is worth serious consideration.

Concerning the effect of the war on sewerage work, Mr. Beckett stated that large camps containing thousands of troops have been established all over the country, and the draining of these and disposing of their sewage has often been a difficult and perplexing problem. In addition to these, the enormous munition and explosive manufacturing plants recently established at various points have introduced into the sewers chemicals that have been found to be extremely detrimental to the sewers themselves and have seriously affected the purification of the sewage at the disposing works. "I should, perhaps, get into trouble with the censor were I to give you the names of these chemicals; suffice it to say that in some cases large quantities of picric acid are discharged into the sewers, and those who know the processes which now successfully deal with sewage purification will realize this changed condition of things and the difficulties with which some municipal engineers have had to contend." There are also numerous manufactories which have enormously increased their output not only of products but also of liquid trade wastes, which by their mere volume have overtaxed the capacity of the sewers and that of the sewage treatment plants.

In addition, the concentration of large bodies of troops and great numbers of men and women employed in munition works has severely taxed the ingenuity of municipal engineers in many localities in order to cope with the increased demand for water. Also the situation of camps and of hastily constructed homes for munition workers has in some cases seriously jeopardized the purity of public water supplies because of the inadequate provision made for sewering the new communities, while the depletion of the municipal staffs has rendered impossible as thorough inspection of the water sheds and the sources of possible pollution as before. Because of this same insufficiency of inspectors, waste of water is increasing. Leaking fixtures are allowed to remain leaking and in these and other ways it is estimated that two-thirds of the present water supply is being wasted. Mr. Beckett states that he has seen it stated that in the United States the waste of water amounts to $25,000,000 a year and possibly much more. "It would be an excellent outcome of the war if the public would assist the municipal engineer and become their own water waste inspectors."

One interesting class of experience which we probably will not undergo in this war is that connected with air raids. Because of these, English municipal engineers have adopted reflectors which throw all of the light from street lamps onto the surface, allowing none to escape directly upward. Another is the necessity for boarding up and shoring up buildings which have been shattered by bombs, and otherwise protecting the public from dangers of injury from them; also the necessity of repairing pavements and frequently water and gas mains which have been broken by the explosions of bombs dropped during these air raids.

THE DESIGNING OF CONCRETE PAVEMENTS

Discussed in the Light of Most Recent Experiences and Investigations—Importance of Drainage Still Not Appreciated—Selection of Materials—Cement, Fine and Coarse Aggregate—Reinforcement—Jointing Materials.

By CHAS. C. BROWN.

Assumption that a concrete pavement is only a little more careful laying of the concrete base for a pavement, with a wearing surface approximating that of a cement walk, is responsible for most of the failures of concrete pavements. As road builders have departed from this assumption on the path leading to special materials and special proportions and special manipulation, to better foundations and better drainage, to more scientific treatment of expansion and contraction of masses of concrete, including consideration of joints, shoulders and reinforcement, they have improved the pavement, though ill-advised experiments in all the items named have led sometimes to very serious failures.

DRAINAGE.

Drainage is a most important factor in concrete pavement success, as it is in every pavement with concrete as a base. Water softens the sub-grade and causes uneven consolidation, permits washing out, and gives opportunity for excessive action of frost, all of which cause strains in the concrete which often result in cracks. Longitudinal cracks in the concrete may result from a lifting of the edges of the pavement by frost, the sub-grade under the center of the pavement being better protected from the cold or containing less moisture to crystallize and expand in freezing. They may also occur on account of settlement or washing out of the sub-grade

at the edges on account of insufficient compacting of the same and subsequent action of water, thus letting the edges settle while the center remains untouched. The same effect is produced when existing gravel or macadam road surfaces are prepared improperly for use as bases for concrete pavements. The center of such roads is almost sure to be higher than the sides and to be harder, especially on roads which have been kept up by dumping the renewal material along the center for the traffic to spread and consolidate. If the low sides are filled instead of the hard center being graded down, the compacting of the sides is likely to be inadequate and later settlement or disturbance by water or frost causes settlement of the sides and a breaking of the concrete pavement lengthwise along the top of the hard ridge.

In some soils, the absorption of water causes a swelling of the sub-grade, the action of which cannot be predicted, and cracks may form in almost any direction. In such soils sub-drains of tile or of stone-filled trenches with or without tile at the bottom, should be provided in sufficient number and with safe enough outlets to keep the soil always free from dangerous amounts of water.

Rather extended observation of road construction in several states shows that the eastern states pay much more attention to drainage than the western states, and that the states with state commission control of specifications and construction make much more elaborate provision for drainage, with very evident improvement of road conditions, and reduction in maintenance cost on account of drainage troubles is apparently much more than an offset for the greater expense of the drainage provisions.

The accompanying group of three photographs sug-

FIG. 1.—A MAIN ROAD IN WAYNE COUNTY, MICHIGAN.

FIG. 2.—A MAIN ROAD IN WAYNE COUNTY MICHIGAN.

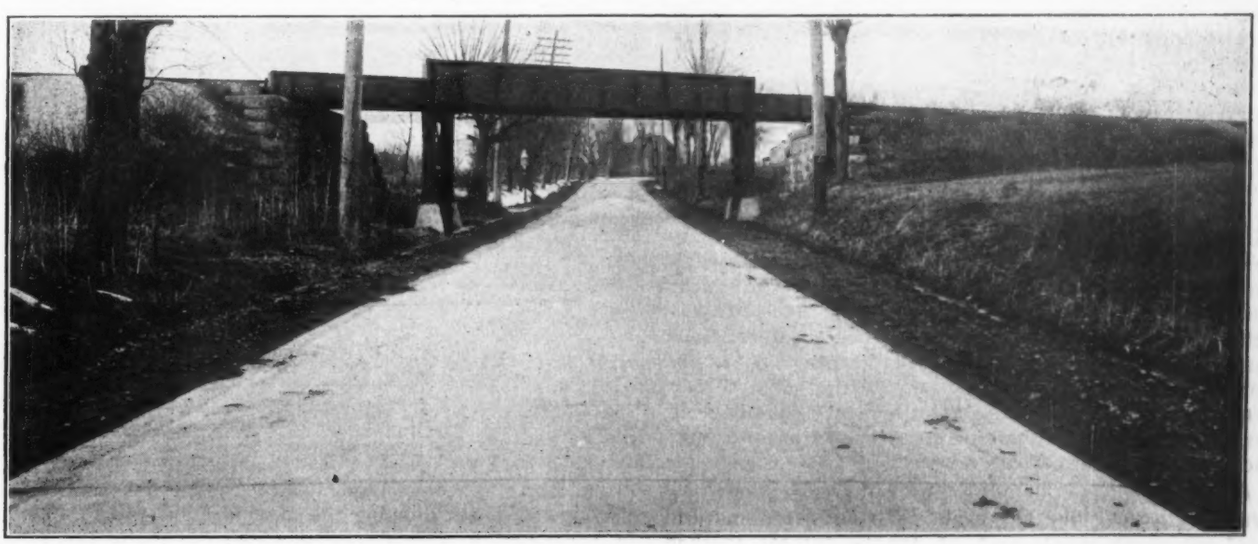


FIG. 3.—EXPERIMENTAL ROAD IN PHILADELPHIA, PA.

In Fig. 1, the excellent facilities for surface drainage seenon the right have not been made use of. If the soil is not very pervious there is danger of cracks due to lifting of blocks irregularly by frost or swelling of sub-grade by absorption of water. In Fig. 2, good surface drainage is seen on the right side, but shoulder should be compacted so as to give smooth surface and plenty of fall to gutter. Equally good drainage should be provided next to the railway track if the pavement crown is not at the left edge. Fig. 3, shows excellent opportunity for good side drainage. Ditches should be deeper and shoulders trimmed and rolled so water can flow off readily.

gests some faults in drainage in otherwise first-class pavements. Examine the photographs of roads as published in large numbers and note how few of them, especially in flat districts, have sufficient provision for surface drainage. The number fully supplied with needed sub-drainage is equally small.

MATERIALS.

Cement is now so thoroughly standardized that it is only necessary to follow the specifications provided by the American Society for Testing Materials and followed by all other societies supplying standard specifications for construction.

The aim in the study of the materials used in constructing concrete pavements is to find such materials and combine them in such a way that the wearing surface shall be impervious to water and shall be as permanent as possible, both in resistance to change in form and volume and in resistance to wear.

With respect to changes in form and volume, many studies are now in progress upon which reports cannot be made. It is believed, as the result of some such studies, that the variation in amount of moisture in the concrete is the cause of variation in volume and form, quite as much as, if not more than, variations in temperature. This suggests closer attention to making concrete waterproof, not only against the passage of water through it, but also against the absorption of small though appreciable amounts of water by the concrete, even though the porosity is not sufficient to permit the passage of measurable quantities of water through the mass of concrete. Hydrated lime is one of the materials now under experiment. Thus far the results of the experiments have not been uniform. Some engineers seem to think that the filling of the voids in the concrete, which is greatly aided by the extremely fine particles of hydrated lime, produces a waterproof mixture which removes the danger of cracks from expansion and shrinkage due to variations in moisture in the concrete. Others think that the effects of this nature are produced by the action of the hydrated lime in increasing the plasticity and flowing qualities of the mortar, thus reducing the chance of using an excess of mixing water and giving better consistency of concrete, greater density and strength. The effect of drying out of concrete is most severe when the concrete is curing or is coming to its normal condition in the road after curing, and if an excess of water is used in mixing, the contraction is excessive and is very likely to produce shrinkage cracks. Anything which will reduce the danger of using an excess of mixing water is therefore advantageous. Some engineers admit this advantage in the use of hydrated lime, but think that the advantage is not proportional to the expense, proper following of good specifications without the lime producing the same result. But apparently the lime makes the mixture slightly nearer foolproof. Integral waterproofing acts by preventing the absorption of water by the concrete and therefore prevents the accompanying expansion. The question seems just now to be in the stage where the progressives are not quite able to prove their case and the conservatives can still claim that they are able to secure equally good results by proper methods of construction according to the older specifications.

Fine Aggregate.—The most approved specifications now provide that the fine aggregate shall consist of natural sand or screenings from hard, tough, durable crushed rock or gravel, consisting of quartzite grains or other equally hard material graded from fine to coarse, with the coarse particles predominating. The differences appear in the percentages of the various grades of sizes. The reasons for these differences may be largely in the composition of the available sands. Natural sands contain a higher proportion of fine sand, but it is often possible to obtain coarse, well-graded sand by mixing a coarse sand and a fine sand from different sources. Sands in which coarse particles predominate, but which are at the same time well graded as to size from coarse to fine, have a low percentage of voids and give mortar of high strength and wearing qualities. The increase in strength, the decrease in permeability and the reduction in amount of cement required may be sufficient to offset a considerable increase in cost of the sand required to give it proper grading.

The common dividing point between sand and gravel is at the ¼-inch sieve. In some cases, especially with bank gravel for coarse aggregate, it may be advisable to use sand all of which passes a ⅛-inch mesh. The proper relation of sizes of fine and coarse aggregate is now under study.

The standard specifications of the American Society of Municipal Improvements provide for ¼-inch sand, 75 per cent between 4 and 50-mesh sizes, and 95 per cent held on 100-mesh sieve. This specification permits a rather fine sand, since the 75 per cent of coarser particles may all be close to 50-mesh size, in which case the distribution of sizes would be defective. But it may admit also the better graded sand of the specifications adopted by the 1916 National Conference on Concrete Road Building, which insure a larger proportion of the larger particles. They provide that from 10 to 50 per cent of the sand shall be coarser than ⅛-inch mesh, and not more than 20 per cent shall be finer than 50-mesh, and 5 per cent finer than 100-mesh. This provides for about 20 to 70 per cent between ⅛-inch and 50-mesh sieves, which with the 10 to 50-per cent larger than ⅛-inch and the 20 per cent smaller than 50-mesh, gives a very fair distribution of sizes to reduce the voids in the sand well toward the minimum.

Both specifications provide for a standard of strength of mortar, one stating that 1:3 mortar must be at least equal to 1:3 mortar of standard Ottawa sand, and the other that it must be equal at 28 days, 10 per cent stronger at 7 days and 25 per cent stronger at 30 days.

The Illinois State Highway Commission, perhaps on account of the difficulty of furnishing clean sand in many parts of that state, allows 3 per cent of clay in sand, for one-sixth of which not more than ½ per cent of loam may be substituted.

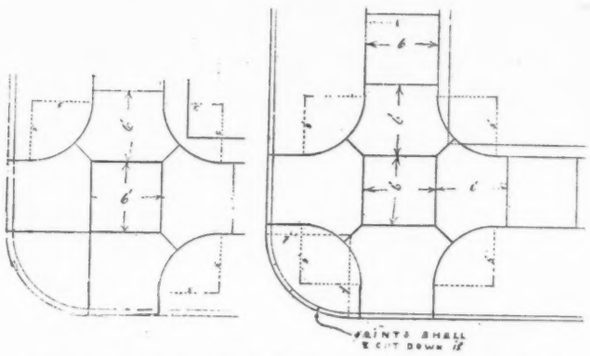
There has been too great a tendency in the past to assume that the concrete pavement must be a cheap pavement to compete with those in the field ahead of it, and so every effort has been made to keep the cost low, many times to the detriment of the concrete pavement, because the result was failure. While the endeavor is still to keep the cost low, greater emphasis is being put on high quality of materials and construction and this, together with the scientific study of its peculiar problems, is gradually improving the general average of concrete as a paving material.

(To be concluded.)

SIDEWALK CONSTRUCTION AT INTERSECTIONS.

The city engineer of Ogdensburg, N. Y., Geo. A. Tate, has sent us plans showing the method employed by him in constructing sidewalk intersections. The feature of these to which he calls attention is the rounding of the corners. He says that he has noticed that in cities where the intersections are made square or practically so, people walk on the grass in going around the corner, while where the corners are made as shown in these plans,

pedestrians follow the curve of the walk. Where there is a tendency to cross the street diagonally, the concrete walk is carried to the circle curb. Where the walk is 8 feet wide it is blocked off into 4-foot squares. The joints in the curb are cut down 12 inches.



PLANS OF CONCRETE SIDEWALKS AT CORNERS.

MUNICIPAL WORK AND THE WAR

Opinions of Mayors in Different Parts of the Country as to the Extent to Which Municipal Public Work Should Be Continued Next Year.

A short time ago Municipal Journal wrote to a number of mayors in various parts of the country asking their opinion concerning municipal work next year—to what extent it should be continued in view of the money and labor conditions and our duties as patriotic citizens of a country at war. We are giving below typical replies that represent all the views expressed by those mayors who replied. These are discussed editorially elsewhere in this issue:

Pehr G. Holmes, Worcester, Mass.—We are planning in Worcester, to carry on municipal public work along normal lines during the coming year. I do not believe that needed developments in our city should be retarted simply because we are at war, and especially when the cessation of such work would be of no material assistance to our Government in prosecuting vigorously our part in the struggle. If, however, it should appear that by abandoning certain improvements we could materially assist the Government I should be willing to see such improvements abandoned, because I feel that the aims and ambitions of the city and individual alike should be subordinated to the needs of our country at a time like this.

President Woodrow Wilson said that civic efficiency must not be destroyed by war. In Worcester it will be our aim during the coming year to not only maintain civic efficiency, but to map our every work and action along such lines as will give a maximum of aid to the government. The upbuilding of the city during the coming year should be carried along so as to take care of the proper growth and expansion of this municipality. This is a function of city government fully as important in time of war as in time of peace. Our development, however, should be confined to those needs which are truly essential. Non-essential things can wait and must wait until such time as the situation is readjusted.

We have in the process of construction a new reservoir with a capacity of three and one-half billion gallons of water, and during the coming year no effort will be spared to rush this piece of work toward completion.

We are planning to lay larger water pipes to meet the need occasioned by a natural and healthy growth of the city, and also for the special aim of reinforcing and enlarging small mains in order that better and additional fire protection for the many manufacturing concerns working on government orders may be secured.

Close attention will be paid to our sanitary needs. The sewer system will be extended so far as it is possible to apply money and labor to take care of the needs of the city.

I consider the building of proper roads of paramount importance at all times, and especially at a time like this when more and heavier trucks are coming into use, with the result that avenues of travel are being subjected to unusually hard usage. In this connection, we have already planned to lay a considerable amount of granite block paving on a cement base, with grouted joints, and there is a large supply of material on hand to carry on this work. We also have on hand a considerable quantity of material ready for next season's work on asphalt, which will also be laid on a six-inch concrete base.

Above all things we shall exercise every possible effort to prevent any curtailment in our educational program this year. More schools are needed to house the ever-growing school children, and probably, at the very least, three six-room buildings will be erected this year. I see no reason why our normal program of schoolhouse building should be interrupted on account of the war.

I do not see any conditions that make me think it wise to postpone any essential public work in the hope of our finding cheaper labor, material or money costs, but no work that is not essential, that does not tend materially to meet some immediate public need, and so fit squarely into our one great public problem of a national effort, should or will be tolerated by me as mayor.

I would not avoid any necessary expenditure, but no unessential project will meet with my approval. Unessential things must await a time more propitious, a time when the United States government does not need all the money and all the labor it can command.

James H. Preston, Baltimore, Md.—We are considering the difficulty in the way of continuance of our public work. In Baltimore the extensions of our city improvements are done very largely by contract. For new paving for 1918 the sum of $2,500,000 has been set aside. For civic center extension and St. Paul street development about $1,000,000 will be available. Both of these come from capital account and will be done under contract. A determination of the problem as to whether the city will go ahead with these extensions will be arrived at very largely by the contract price which we make, and I have taken steps to have the contracts advertised early in January, so we may determine as far as possible the policy of the coming year. If the contractors can obtain the material and labor and go ahead with the work at anything like reasonable price, our policy will be to proceed with the work as usual. If, however, the material and labor cannot be obtained by the contractor, or the bids therefor are inordinately and unreasonably high, then Baltimore will probably suspend the extension of her public work until we can see daylight a little more clearly. The general city work,—repairs to city streets, water mains and the various engineering maintenance service—will be, of course, continued as best we can.

Charles E. Taylor, Little Rock, Ark.—I believe that a mistake would be made if the policy should be adopted at this time of stopping all municipal public work. Those engaged in manufacturing materials and equipment for carrying forward such projects would become non-producers if such policy were adopted, and skilled mechanics all over the country would be thrown out of work to which they are accustomed and forced to seek other fields of usefulness in which they would probably receive less money and, therefore, be less able to contribute, through the purchase of Liberty Bonds and otherwise, to the support of the war. It would seem to me that the better policy would be for municipalities to handle their affairs with due and proper conservatism and economy, but to continue needed public improvements of a general character.

James C. Dahlman, Omaha, Neb.—We have under contemplation the spending of $400,000 in the building of sewers. The bonds will be offered for sale in January, and if we succeed in selling them, the work will be done. We are also issuing $100,000 worth of intersection bonds, and if they sell, we will go ahead with the most of the paving we have figured on for 1918. We are authorized under the law to issue $100,000 in bonds for parks and boulevards. We have cut this down to $50,000, and if we sell the bonds that improvement will be carried out. We are also figuring on building a $100,000 police station. These bonds were sold some two or three months ago and this work will be done. The amount of improvements we shall make will depend on the sale of these bonds, as all this work is work that is absolutely necessary. We do not intend to make any that are unnecessary. However, we hope to do as much as possible. If we carry out the work in view, there will not be much decrease in the amount of improvements we shall make in 1918, as compared with those of 1917.

D. B. McKay, Tampa, Fla.—We have just finished a campaign in this city and county for a bond issue of $875,000 for an extension of the good roads system. I was prominently identified with this campaign, and my newspaper, the Tampa Daily Times, led the fight. I am glad to say that by their votes the people have decided in favor of the issuance of the bonds and the work will be in progress in a very short time. We took the position that it is a patriotic duty to connect up the highways with the main arteries leading to various parts of the state. thus relieving congested condition of the railways, and so that the farmers will be encouraged to produce larger crops and at the least possible cost. The city is not contemplating any new work at the present time, except the paving of some new streets to the region of our new shipbuilding operations.

C. D. O'Callahan (for Mayor Barber), Joliet, Ill. It will be the policy of the city to take the necessary steps during the winter months to plan and provide for an active year in street paving and sewer extensions. Having the preliminary work out of the way, we will be guided by the conditions existing in the spring as to whether or not any of this work will be prosecuted.

Wendell D. Rockwood, Cambridge, Mass.—The prices of material and labor for street construction have not yet been lifted to a point that would curtail street paving in our city. If we fail to do as much street construction during the next year or two as we have in the past, it will not be so much due to market conditions as to the fact that most of our principal streets are now well paved.

George N. Seger, Passaic, N. J.—I believe that cities are likely to suffer unless the stitch in time is taken, in other words, public property should not be allowed to deteriorate because times are abnormal, but new and extensive work should be undertaken only after very mature consideration. The average property owner has found his hand in his pocket to help prosecute the various war activities for the last six months and will have to dig deeper before this conflict is over and can, therefore, illy afford the payment of heavy assessments for improvements unless the same are absolutely necessary. There is also the question of depriving the government of the necessary man power which it is imperative for it to have by using this man power on municipal work which can be deferred until a later time. So far as the price of materials is concerned, it is my opinion that the same will not be materially less until after the war is over and only such work should be undertaken that will make for the health, welfare and growth of the community.

Harry Pillans, Mobile, Ala.—I am very much impressed with the necessity of the exercise of prudence in the expansion at this time of public works other than the most necessary ones, believing that the utmost of our energies must be devoted in sustaining the government in this war that Germany by her offenses has brought upon us. However, this city, and largely because it was believed that the work to be done was a work in advancement of the government's interests and needs in connection with this war, has just borrowed upwards of a half million dollars with which to build a pier in the upper bay below the mouth of the river, enclosing a very commodious haven, and to lay connecting tracks from this pier to the trunk railways entering the port, and is now advertising for bids for construction of these works, with the hope that the same can be put under way within a few months. Yet, the change in prices since the estimates were made promises greatly to embarrass the city in this work.

R. J. Andrews, Sioux City, Ia.—It seems to me that every community can afford and ought to forego the benefits and pleasures of public improvements to as great an extent as possible so that labor and materials required for such improvements may be released and be available for the requirements of our country now at war. There are undoubtedly a million men, now employed in one way or another by the government, who will be released from service at the close of the war, and if states, counties and municipalities can then give employment to these men, it will save us much trouble.

Charles A. Simon, Schenectady, N. Y.—I believe the exigencies of the nation demand that no extensive municipal public work or improvement be undertaken unless vital to the welfare of the people. This is a principle that will be subscribed to quite generally by municipalities throughout the country, since it will help to make available for the use of the Government the fullest possible measure of the nation's economic resources.

John MacVicar, Des Moines, Ia.—It is my judgment that the appeal of Secretary McAdoo should be respected and that municipalities and other public bodies should generally suspend all public improvements with the exception, of course, of whatever improvements are immediately necessary. Among these necessities I believe would be any public works that have a direct bearing upon the preservation of life, health and property.

TRAFFIC POLICE IN THE SPOTLIGHT.

After a number of accidents in which traffic officers were struck by automobiles, the city authorities of St. Louis devised a method of protecting the police who stand at the street intersections of the congested district. These mishaps occurred largely because the lighting at the crossings was not sufficiently bright to enable the officers to be seen on dark and foggy nights, and to remedy this condition a searchlight was placed on the tenth floor of a building at one of the corners. The ray was focussed upon the center of the crossing where the policeman stands, so that he was in the brilliant light

ST. LOUIS TRAFFIC OFFICER STANDING IN SEARCHLIGHT.

and his signals could be seen without difficulty. The additional precaution was taken of supplying rubber coats and gloves with big gauntlets, all of white material, so that in the rain and fog he would be more conspicuous than ever. Since trying this plan, the number of accidents has diminished to such an extent that five searchlights have been installed at especially dangerous corners.

TRUCKING FREIGHT.

A fleet of 22 White trucks are operated for general freight haulage between New York and Philadelphia and to other cities by the Beam-Fletcher Corporation, Philadelphia. They leave Philadelphia at 8 o'clock at night to reach New York at 6 a. m., and another group leaves New York at 5 p. m., and are due to reach Philadelphia at 3 a. m.

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Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

SHOULD MUNICIPAL WORK BE CONTINUED?

The manner in which the United States performs its share of the prosecution of the war during the coming year is of the utmost importance to every man, woman and child who expects to outlive it. In the actual fighting, we believe that our boys in France and on the ocean will give a good account of themselves. Their task is strenuous but comparatively simple; their duty is clear—to give up their lives if need be, but to sell them dearly. The real problems are to be met here at home, although the sacrifices asked are those of money and time only, and not of lives. But these also must not be sacrificed needlessly; and to insure this, no important steps involving them should be taken without serious consideration.

Another point must not be lost sight of. This war found us in a state of total unpreparedness. Peace will probably come upon us with less warning than did the war, and when we are exhausted and less able to make strenuous efforts along new lines. Let not peace find us as unprepared to take a prominent place and do our part in the reconstruction of the whole world as war found us to play our part as a fighting ally.

To city officials as such the immediate problem, and one that must be solved within the next few weeks, is that stated above: "Should municipal work be continued?" In order to learn the general opinion on this subject, we wrote to several score of mayors asking them to tell us how they felt in the matter. On another page we publish twelve replies that are typical of those received. It will be noted that all but one or two agree that all necessary work should be carried on; also that under this head should be included all having a direct bearing upon the health and safety of the citizens, and at least that portion of the street and highway system that is necessary for carrying the business traffic of the country. The differences lie chiefly in the relative emphasis placed upon the continuation of the necessary and the discontinuance of the unnecessary, respectively.

We believe that there are few who will not admit that the following are among those things necessary either because of or in spite of the war: The maintenance of existing or construction of new hard-surface pavements on the streets and roads used by traffic connected with munitions of war and the necessities of life, especially food and coal. The maintenance of existing sewerage, sewage treatment, water supply and water purification plants, and the extension of such systems to meet any growth of the city. The replacement of boilers or pumping plants by more efficient ones by which a saving can be made in the amount of coal used. The placing of meters or other changes in water department administration by which a saving in the amount of water pumped can be made. Any extensions in the water plant by which the effectiveness of fire protection can be increased. Street lighting as an aid to police protection. Street cleaning and garbage collection and disposal.

Others can be named, but this list would seem to demonstrate that a large amount of municipal work will be necessary during the coming year to maintain the health and efficiency of those who, remaining at home, must support our army in its supreme effort.

MORE POWER TO FIRE PREVENTION OFFICIALS.

"Our inspections are superficial. The fire marshal hasn't even the power of an efficient rubbish inspector. The commissioners have no authority to make anybody remedy bad conditions. We ought to have the authority to inspect buildings that are fire-traps and force the owners to remedy the conditions, but, if we should try such a thing, the owner could laugh at us. We have no power to make people do anything." These were the words of fire commissioner Thomas J. Bosquett of Detroit after a disastrous store fire last March in which a captain and four firemen lost their lives. Coroner Rothacker found that building inspection was lax because there were not enough inspectors to cover the ground. Some cannot make their rounds oftener than once in two years.

"There is no satisfactory law or ordinance giving the city proper control of such a situation. There are a number of places in which films are stored and some of them we don't know anything about because we get no track of them. A stringent ordinance should be passed immediately to remedy the situation, and the use of any building where people live should be prohibited for such purposes." City building inspector Jacob G. Hilkene of Indianapolis made this statement last May after an explosion and fire in an apartment house in which six persons died and three firemen were injured.

"Responsibility for these deaths lies in the city's failure to condemn these flimsy fire-traps. Time after time we have asked them to condemn buildings like this, but they haven't done it." This was the bitter complaint of fire chief Thomas R. Murphy of San Francisco when they brought out the bodies of his assistant chief and two of his men in a lodging house fire a few weeks ago.

These three tragedies serve to indicate the great potential danger, not only to property, but to the lives of fire fighters, due to the impotence of the authorities in abolishing fire-traps. These officials had long realized the need of fire prevention and did not have to be convinced. But their hands were chained and their orders had no strength. This is the condition in most cities. Fire pre-

vention laws are worse than useless unless they are backed by swift, vigorous enforcement. They are a mockery because they render inspectors helpless and discouraged and tend to weaken their morale until their work becomes lax and worthless.

A strong fire prevention bureau, with full powers; an adequate, trained and honest corps of inspectors, with all the prevention work centralized in its jurisdiction, are absolutely essential to any fire prevention activities which are not merely designed to produce a false sense of security. Complete and stringent laws and an orderly routine that will bring the law to bear on cases without red tape or subserviance to building owners are the basic factors of real fire prevention. The city should have power, if a fire has occurred in any building where an order was not complied with, to secure payment by the owner of the entire cost of extinguishing the fire. This is already established in New York and Cleveland. It is more than just—it is vital to the public welfare.

There is no danger of despotism by the fire department if such powers are vested in it. The lives of the firemen are at stake as well as those of the citizens. Strength is needed to beat back the continued, underhanded attempts of the vicious among the building interests to undermine the fire prevention laws. Sometimes the attack is brazenly frank, as in the case of New York city, where the counsel for the Real Estate Board urged the extinction of the city's successful fire prevention bureau because it had spent about $2,000,000 in the last six years and had caused property owners to spend about $18,000,000 to carry out its orders.

The powers of fire prevention bureaus must be carried to the point of those of New York's bureau—and beyond. No one questions the right of the health department to quarantine a smallpox patient. The man who maintains a fire-trap is a worse potential danger to the community.

PRESSING SEWAGE SLUDGE

Methods and Appliances in Use—Character of Sludge Affects Results—Preliminary Operations—Pumping and Conveying Sludge.

Sewage sludge, by whatever process obtained, contains such a large amount of water that it is difficult to handle it and almost impossible to dispose of it without nuisance unless the water content is reduced. Sludge may be dried by air-drying or by artificial heat, or it may be dewatered by centrifugal machines or by filter presses. It may also be produced with a consistency suitable for handling, although containing 80 per cent moisture, by the Dickson process, first employed on a large scale at Dublin. This consists, essentially, in the addition of 0.5 per cent of yeast to the raw sludge, allowing it to ferment for from 20 to 24 hours at a temperature of from 90° to 94° F., and then, when the sludge floats at the top, drawing off the underlying liquor.

Air-drying is the process most commonly employed, generally by drawing it off onto sludge beds. Next to this, filter pressing has been used most generally. The latter method was discussed by Kenneth Allen, engineer of sewage disposal of the Board of Estimate and Apportionment, in a paper prepared for the American Society of Municipal Improvements; from which the following has been abstracted.

USE OF FILTER PRESSING.

Dewatering sewage sludge by filter pressing with the plate type of press has been brought to a point where its efficacy and cost can be close predicted. With fresh settled or precipitated sludge and the addition of from 0.5 per cent to 3.0 per cent of lime and a pressure of 70 or 80 pounds per square inch, a firm, satisfactory cake can be produced.

Several of the newer forms of press promise an improvement on the older plate press, but experience with them in handling sludge has been so limited that their comparative merits are not yet definitely known.

The great demand for sludge pressing in the past was the result in large measure of the practice of chemical precipitation. This kind of treatment is unquestionably on the decline for normal sewages, but in the mean time the activated sludge process has appeared and promises to be adopted with success in many situations, and the necessity of promptly dewatering the large volumes of watery sludge it produces may lead to an increased demand for sludge pressing in the next few years. Moreover, the fact that new processes for recovering the valuable ingredients in sludge combined with the increasing demand for grease and ammonia all tend to a development of methods of dewatering, of which filter pressing, up to the present time, is the most prominent.

Quoting John T. Thompson of Leeds: "Progress already made in this direction shows that in time it will be possible by artificial processes to get rid of all sludge without causing any nuisance, and make sufficient by the sale of by-products at least to pay the full cost of disposal."

SEWAGE SLUDGE.

The density, composition, appearance and odor of sludge depend on the sewage from which it is derived, whether from the separate or combined system, domestic or with a large proportion of trade wastes, fresh or stale, etc., and also on its manipulation, whether by mere settling, chemical precipitation, digestion in septic or Imhoff tanks or aeration in the activated sludge process.

The volume produced daily per 1,000 population is, according to Dr. Imhoff, 1.57 cu. yds. in the sedimentation tank, 0.79 cu. yd. after drawing off the supernatant liquor, 0.262 cu. yd. after digestion from combined sewers and 0.131 cu. yds. from separate sewers.

Sludge Data.

Derived from	Moisture Per Cent	Cu. Yd. per m.g.	Lb. per cu. yd.	Dry Matter Tons per m.g.
Imhoff tanks	80-85	2- 4	1740-1840	0.161
Plain sedimentation	88-96	4-10	1700-1780	0.580
Chemical precipitation ...	86-94	20-30	1710-1790	1.435
Activated sludge process	98-99	20-80	1690-1700	0.67

With strong sewages or those carrying much grit, especially where treated by plain sedimentation or in Imhoff tanks, these figures may be exceeded. The weight of sludge from chemical precipitation is, of course, increased by the chemicals added.

Different sludges vary in their adaptability to pressing. Plain settled sludge or a sludge greasy in its nature is difficult to press. If fine in composition, it flows too freely through and then clogs the filter cloths, leaving the cake in a pasty condition that will not cohere.

Septic sludge varies greatly in consistency, depending on the thoroughness of digestion. Ordinary septic tank sludge is fine in composition and offers much the same difficulty as plain settled sludge in passing through the filter. Elsner, however, claims that septic sludge, as well as lignite sludge, is more amenable to pressing without the addition of chemicals than is plain settled sludge.

Considering the granular condition of well-digested Imhoff sludge and its freedom from matter of a viscid or

mucous nature, it would seem probable that this might be dewatered readily by pressing, provided a fine filter medium be used. But as such sludge can be air-dried easily at slight cost and without offense, there seems little likelihood that pressing will be used to any extent for dewatering.

Precipitated sludge is most favorable for pressing because the lime used in precipitation gives it a certain "body," enabling the cake to cohere without becoming pasty and smearing up the filter cloths.

PRELIMINARY OPERATIONS.

Before pressing the sludge from sedimentation or precipitation tanks, it is usually drawn or pumped to a sludge-settling or concentration tank, dosed with milk of lime, settled for from 12 to 24 hours and the supernatant liquor drawn off. This reduces the contained moisture to 85 or 90 per cent, and the volume perhaps 50 per cent. Although the cost of treatment and disposal of sludge cake and the volume of the latter are all increased by this addition of lime, this is more than counter-balanced by the reduction in the time and cost of pressing.

Sulphuric acid, where used in connection with a greasy sewage, is also valuable in concentrating the sludge. The most notable works of this kind are those at Bradford, England, the largest sludge-pressing plant in the world, where 128 presses deliver 3,700 lbs. of cake each per run. The sewage, which contains 440 p.p.m. of grease, is first screened, then precipitated with 2.8 tons of sulphuric acid per million U. S. gallons of sewage. This produces 40 tons of sludge per m.g., containing but 80 per cent moisture, which is again screened, heated and delivered to the presses.

Sulphuric acid is also used for sludge concentration at Oldham by Dr. Grossman. Here 0.3 per cent by weight of acid is added to sludge of 87 to 90 per cent moisture and after resting, the clear liquor is drawn from beneath, leaving the concentrated material with from 70 to 74 per cent moisture.

In this country experiments in the use of sulphur dioxide have been made on Boston sewage by E. S. Dorr and R. Spurr Weston, with particular reference to the recovery of grease and fertilizer. The method of treatment is patented and is known as the "Miles" process. It was found that one ton of sulphur dioxide per m.g. of sewage produced, after settling 8 hours, 6.7 tons of sludge, 85.8 per cent moisture. By further settling for 26 hours there can be obtained 4 tons of concentrated sludge 80 per cent moisture in a condition suitable for pressing. The advantage claimed in the use of sulphur dioxide is the thorough separation of the grease from the sewage and the low moisture in the sludge.

In general it is found best, if not always necessary, to add lime to almost any sludge before delivering to the press. Even this may not be sufficient where the sludge is high in grease, as was found at Frankfort. Here, to render the process effective, resort was had to the addition of sulphate of alumina and heating the presses, but this procedure was abandoned on account of the cost. A preferable way is to crack the grease with sulphuric acid, as is done at Bradford, settle, draw off the clearer liquor and press the sludge, now reduced to 80 per cent moisture, in hot presses. The cake is thus relieved of the greater part of the grease, which passes off with the drainage liquor, is recovered and sold.

A similar process was tried at Cassel, Germany, a few years ago, producing dried fertilizer and grease, as at Bradford. But here, though the wet sludge averaged 18 per cent grease, the process was abandoned after three years' trial on account of the fuel required to heat the wet sludge and dry the cake.

The amount of lime which should be added to sludge before pressing depends on the character of the sludge, on the amount previously used for precipitation, etc. In English practice it usually varies from 0.5 per cent to 1.0 per cent by weight of the wet precipitated sludge, or from 3 per cent to 7 per cent of the pressed cake.

John T. Thompson, chemist and acting manager of the Knostrop sewage works at Leeds, England, concluded from experiments that good cake, 60 per cent moisture, may be readily produced from fresh sludge by the addition of 1 per cent lime and suggests the following simple test for the foreman to apply: "If the press effluent is just alkaline to phenolphthalein a good cake can usually be obtained in 45 minutes, but if the effluent gives no color reaction it may take 1½ to 2 hours to get the same result."

Several English plants report using 8.4, 10.1, 37, 47 and 84 lbs. per cubic yard respectively. Septic sludges, however, have required as much as 9.6 per cent to 15 per cent of the weight of the pressed cake. This is excess of lime required above that for mere precipitation, and should not be added before precipitation as it has an unfavorable effect on the effluent, promoting secondary putrefaction, deposits of sludge on the stream bed and the clogging of filters and retarding nitrification. In 1916 Worcester, Mass., used, for pressing 57.9 lbs. of lime per 1,000 gals. of sludge, and Providence, R. I., 80.6 lbs.; the former producing 13,192 tons of cake during the year and the latter 23,511 tons.

Lignite sludge is produced by adding finely-ground lignite mixed with water and then, as it passes through a baffled trough, a solution of sulphate of alumina. Sludge with 90 per cent moisture is produced at Spandau in a condition for pressing as it comes from the tanks, but the cake contains 8 or 10 per cent too much moisture, so that it disintegrates easily if exposed to the rain, and should therefore be stored under cover.

Before the sludge is pumped to the presses it should be coarse-screened to remove any rags, sticks or other coarse matters, which might clog pipes or channels or bring unequal pressure to bear on the plates of the press, causing them to crack. The screening may be accomplished by downward discharge of the sludge through a basket or cage screen, or by forcing it or allowing it to flow through a bar screen or rack, or by use of a coarse band screen.

CONVEYING SLUDGE.

From the concentration tank the sludge usually flows to a pump well, whence it is pumped to the presses. The slope of chute or pipe necessary to cause sludge to flow through it is 1:10 to 1:15 for settled sludge containing at least 90 per cent of water, the steeper grade if it contains much sand and coarse material. If the sludge contains about 95 per cent of water and little sand, a slope of 1:100 may be sufficient, but 1:80 is better. For sludge obtained with interrupted operation a fall of 1:40 to 1:50 is necessary. At Fitchburg the slope is 1:90, and the new concrete channels for Imhoff sludge at Columbus are sloped 1:56.

Force mains for sludge, if less than 8 in. in diameter, offer undue resistance, although in Mannheim it is conveyed 1¼ miles in iron pipe 5.85 in. in diameter. On curves, the radius of the center of the pipe should be at least five times its diameter. Changes of cross-section should be avoided to prevent clogging, but if unavoidable, means for back-flushing should be provided.

A pipe carrying an acid sludge generally remains clean, sludge containing chlorine in excess will produce rusting, and unslacked lime or an excess of lime tends to cause deposits. If allowed to stand for a considerable time in a pipe, especially if permitted to drain, sludge may adhere

to the inside of the pipe and cake, and be difficult to remove. Nevertheless, with proper precautions, long lines of sludge mains are satisfactorily maintained in operation. In several plants in England sludge is pumped for four or five miles through 8-in. to 12-in. pipe.

PUMPING SLUDGE.

Screened sludge may be pumped by almost any type of pump if designed for such service; but pulsometers, chain pumps and ordinary ejectors are inefficient and suitable only for occasional or emergency use, or where the volume is so small that economy of power may be disregarded. The Shone and other pneumatic ejectors are well adapted to such use, being automatic in operation and with few moving parts. The air lift has been used for pumping Imhoff sludge abroad and in Fitchburg, Mass. There seems to be no good reason why it would not be applicable to other sludges, although the released air might increase the diffusion of odor, which at best is often offensive where sludge is handled.

Membrane pumps and air receivers are in use in Europe. The former consists of two cylinders connected by pipes, one cylinder having a diaphragm near each end, the other a plunger which causes high and low pressure alternately in the first cylinder between the diaphragms, which thus draw the sludge in through one port and expel it through another. A rubber membrane lasts 8 or 10 months. The air receiver consists of a tank similar to a boiler, furnished with large inlet and outlet sludge connections and connected to an air compressor or vacuum pump. The receiver is filled by gravity or by exhausting the air inside and the sludge is then expelled by admitting air under pressure. They usually operate in pairs, one filling while the other is being emptied.

Centrifugal pumps are used for sludge but should be specially designed with large clearances. It has a higher efficiency than the contrivances just named, but is not adapted to pumping thick sludge under high pressures. Reciprocating plunger pumps are usually to be preferred to centrifugal pumps and in small installations are sometimes the best to adopt on account of their simplicity and ability to operate under sudden and great variations of pressure.

SLUDGE PRESSES.

The most common form of filter press consists of a series of plates 30 to 54 in. square, set parallel, depressed surfaces forming a cell between each two successive plates. Each plate has a large hole in the center. When in use, cloths placed between the plates form linings to the cells or flat bags, into which the sewage is pumped under pressure, the liquid escaping through the cloth and the solid matter being retained in the cell. The sludge is subjected to a pressure of 50 to 120 lbs. per square inch. When water ceases to leave the cells, the compressed cakes of sludge are removed from them for disposal. Pressure may be maintained from 15 to 90 minutes, depending upon the nature of the sludge and the degree of solidity desired. The cost in Worcester, Mass., of pressing a daily average of 37,600 gallons of sludge to cakes of 72.8 per cent moisture was $5.71 per ton of solids in 1916, or $7.05 per million gallons of sewage. The cost in Providence was $2.78 per million gallons of sewage, or $3.38 per ton of dry solids.

Other filter presses have been experimented with, the Kelly, Sweetland and Berrigan being descried by Mr. Allen. The Kelly consists of a cylindrical shell in which are placed a number of parallel filter leaves, each carrying a bag stretched over a frame through which the sludge is strained, the leaves being supported by a carriage that slides in and out of the cylinder. The sludge cake is formed on the outside of the bags by pressure of about 40 lbs. in the cylinder, the liquid entering the bag and flowing off through a pipe. The carriage is removed and the cake loosened from the bags.

The Sweetland operates on the same principle, but instead of the filter leaves being removed from the cylinder, the cylinder is made in halves, the lower half hinged to the upper and bolted in place while pressure is on, but being swung down out of the way when the cake is to be removed, which is done by blowing air outward through the bags.

The Berrigan or Worthington press consists of a number of unbleached muslin bags inclosed in a bag of special fine canvas. These are hung vertically between plates that are drawn together by means of a toggle joint, squeezing out the superfluous water. The pressure is gradually increased to about 60 lbs. per square inch. In the Milwaukee experimental plant a press reduces about 5 tons of cakes per 24 hours to 75 per cent moisture. T. Chalkley Hatton estimates the cost of operating this as $3.46 per ton of cake produced.

HAULING STONE IN TRAILERS IN OREGON.

The commissioners of Lane county, Oregon, a few months ago purchased some large dump wagons to be used as trailers to a caterpillar tractor in hauling broken stone for road construction. They found this method much more economical than either teams or motor trucks, and are contemplating the purchase of several more similar wagons. On one road job the cost of hauling by trailers was about 25 cts. per cubic yard as against 65 cts. asked for hauling in trucks.

TO PURCHASE LIBERTY BONDS.

Douglas County, Oregon, in making up its budget last month, inserted an item of $50,000 for the purchase of Liberty Bonds of issues to be made within the coming year, with a provision that when the bonds mature, principal and interest shall be used to construct a new county court house.

FREE WATER IN SANTA ROSA.

Santa Rosa, Cal., is a city of about 12,000 population, covering two square miles. It operates a sewage disposal farm, from which it realized $1,187 during the year ending June 30th, $536 of which was from the sale of hay, $393 for pasturage, $100 for fertilizer sold, the balance for sale of wood and corn tops and rent of land.

In the administration of its water works plant there are several interesting details. The system includes about 36 miles of mains and 184 fire hydrants. There are 2,464 taps in service. Water is pumped from wells by electric power, a complete steam pumping plant being held in reserve.

Each residence is allowed 10,000 gallons a month free for domestic purposes only, a charge of 25 cents per 1,000 gallons being made for the second 10,000 gallons, 20 cts. for the third 10,000, and 15 cts. for all above this. (10,000 gallons would give 55 gallons per capita per day for 6 persons in a house, or 67 gallons for 5 persons.) Of the 2,464 taps, 2,108 are metered, with free allowance; 29 are churches, parks and public buildings with unlimited free allowance, 38 are metered and all consumption is paid for, and 289 are on a flat rate, unmetered. It is estimated, using the rates above, that during the year ending June 30th the public buildings, churches, etc. used without charge $1,749 worth of water, and that the

fire hydrants, at $60 a year, would yield $954. The cash receipts were $5,648; a total credit of $8,351 (allowing nothing for the free water for domestic use). The total debits were $10,216, leaving a deficit of $1,865—less than $1 a year for each residence receiving free water. However, $10,885 was required to meet interest and sinking fund charges, which would increase the cost for free domestic water to about $6 a year for each tap.

The deficit is about the same as is experienced every year, and is made up by transfers from the general fund. "The city in general derives considerable benefit and distinction as being a city of lawns and beautiful gardens, which no doubt can be credited to the generous allowance of free water."

ROADS AND THE ARMY TRUCKS.

In our issue of December 22 we referred to the fact that roads had been picked out over which thousands of army trucks now under construction were to travel to Atlantic ports for shipment to France, thus relieving the railroads of the burden of carrying them and also such freight as the trucks themselves could carry; and we called attention to the importance of constructing and maintaining the roads over which these trucks must travel in the best possible condition to withstand the duty thus imposed upon them. In another article on the same page we suggested the advisability of using snow plows for filling in snow ruts and leveling off snow-covered roads, with a view to protecting the roads and also to keeping them in beter condition for traveling while the snow remained.

Both of these items are suggested by information which we have received from John Laylin, consulting highway engineer of Norwalk, Ohio, and secretary-treasurer of the Ohio Engineering Society, relative to the passage of the first fleet of thirty army trucks through Norwalk on Sunday, December 16. The fleet arrived in town from 7:30 to 8:30 p. m. on Sunday, after a strenuous trip over roads drifted with snow by the storm that had preceded and accompanied them from Detroit. One of the officers accompanying the fleet said: "We take our hats off to Huron county. It was the first dragged road we struck and it let us come to our limit of 12 miles per hour from Bellevue here." County engineer Starbird had dragged this road with snow plows and smoothed out the ruts in preparation for the fleet. The beneficial effect of this was especially appreciated by the drivers of the fleet from the fact that, as described by Capt. E. B. Butchers of the U. S. Engineers, "The snow drifts in Michigan had not been taken care of at all. We were delayed five hours at one drift. And the counties this side of Toledo had not done much better, either, until we struck your county and it certainly made a hit with us."

(Right here let us say that we can see no reason why this use of snow plows is not as legitimate a duty of the highway department as the use of scrapers in summer or as any other work devoted to keeping a highway in the best condition for traffic. As shown by this instance, some road officials have adopted this as a practice, but those who have done so, we fear, are greatly in the minority. As stated in a previous article on the subject, the saving of the road surface from the destruction caused by all traffic following in one rut is an even more beneficial effect of snow plowing than that of temporarily facilitating travel.)

The illustration shows the army trucks parked along the curb in Norwalk, where they spent Sunday night, there being no garages in town whose doorways would admit them. Many of them carried signs such as "Packards for Pershing," "Detroit to Berlin." As shown, the trucks all had storm curtains enclosing the driver's seat, while the truck itself was covered by canvas stretched on hoops like the old fashioned "prairie schooner." Every car had a search light in front. Most of the fleet were army trucks, but there were also four Dodge passenger cars, and two of the trucks were equipped as tank cars. The trucks were all 3-ton Packards. The train was in command of Capt. Bronson and Lieut. C. A. Riley, in addition to which there were seventy-eight enlisted men—mechanics, drivers and cooks. The local paper, the Reflector-Herald, noted for the interest and encouragement of the women that most of the boys wore knitted helmets, sweaters and the long wristlets such as are being furnished so abundantly by the women of the country. This paper says: "The road system was mapped out, started and completed, as far as gone, under Messrs. Laylin, Herrick & Starbird, and the wisdom of their high standard insisted upon is now amply attested. The army men are lavish in their praise of Huron county roads and bridges, and we may thank the efficiency of our engineers for these compliments."

ARMY TRUCKS PARKED IN NORWALK, EN ROUTE FROM DETROIT.

FIRE APPARATUS OPERATION.

Average Number of Miles Run per Gallon of Gasoline Last Year by Each Kind of Apparatus—Reports from Two Hundred and Fifty Cities.

On the two pages following this will be found figures concerning mileage made per gallon of gasoline by fire apparatus as reported by fire chiefs of those cities not included in last week's issue. There is great variation in the figures and, as stated last week, this is to be expected when we consider the great differences in mileage run in the different cities (see table in December 15th and 22nd), the speed made, weight of apparatus, and experience of and care exercised by the drivers.

Averaging all the figures for each kind of apparatus, we obtain the following: Chief's cars, 12 miles per gallon of gasoline, average; chemical and hose with ladders, 7.4 miles; chemical and hose without ladders, 8.9 miles; hook and ladder trucks, 6.9 miles; triple combinations, 6.5 miles; hose wagons, 9.9 miles; tractors, 3.9 miles; chemical engines, 9.3 miles; gasoline pumping engine with hose, 6.2 miles; same with chemical, 6.1 miles; same without hose or chemical, 4.7 miles; gasoline-driven steam pumper, 5.2 miles; fuel or service wagons, 10.2 miles; repair wagons, 10.6 miles; squad wagons, 5.0 miles; water towers, 6.2 miles.

MOTOR APPARATUS OPERATION. MILES RUN PER GALLON OF GASOLINE (Continued).

City and State.	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine and Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumping Engine With Chemical.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Minnesota:																
Anoka	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bemidji	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Detroit	....	15	....	....	10	....	....	....	....	....	....	....	....	....	....	....
Duluth	11½	1½	....	1½	1½	....	....	....	....	....	....	....	....	....	....	....
Minneapolis	9	1½	....	1	1	....	2	....	....	....	....	....	....	....	2.6	....
Virginia	12	10	....	....	8	....	....	....	....	....	....	....	....	....	....	....
Winona	15	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mississippi:																
Vicksburg	12	3	....	3	....	....	....	....	....	....	....	....	....	....	....	....
Missouri:																
Cameron	....	12	....	....	....	12	....	....	....	....	....	....	....	....	....	....
Moberly	....	2½	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Springfield	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Webster Groves	18	15	....	....	12	....	....	....	12	....	....	....	....	....	....	....
Nebraska:																
Nebraska City	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Norfolk	....	9	....	15	....	....	....	....	....	....	....	....	....	....	....	....
Nevada:																
Reno	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....
New Jersey:																
Hackensack	14	10	....	12	....	....	....	....	6	....	....	....	....	....	....	....
Jersey City	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Roosevelt	....	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....
New Mexico:																
Raton	18	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Roswell	14	3	....	....	....	9	....	....	....	....	....	....	....	7½	....	....
New York:																
Auburn	10	4	....	3	....	....	....	....	....	....	....	....	....	....	....	....
Batavia	....	8	....	7	....	....	....	....	....	....	....	....	....	....	....	....
Canastota	....	13	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Geneva	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Johnson City	12	....	7	7	....	9	....	....	....	....	....	....	....	....	....	....
Liberty	....	10	....	....	....	10	....	....	....	....	....	....	....	....	....	....
Mamaroneck	....	8	....	....	....	....	....	....	8	....	....	....	....	....	....	....
Mechanicsville	....	10	....	....	....	10	....	....	....	....	....	....	....	....	....	....
New Rochelle	8¼	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Peekskill	15	....	10	6	....	....	....	....	10	....	....	....	....	....	....	....
Rye	....	8	....	6	....	8	....	....	....	....	....	....	....	....	....	....
Silver Creek	....	....	....	....	....	6	....	....	....	....	....	....	....	....	....	....
Solvay	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Watkins	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....
Waverley	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
White Plains	9	9	....	....	....	....	....	....	....	....	....	....	....	....	9	....
Yonkers	8-10	....	6-8	6-8	....	....	....	....	6--8	....	....	....	....	....	....	....
North Carolina:																
Raleigh	7½	5½	....	5½	....	....	....	....	....	....	....	....	6	15	....	....
Ohio:																
Akron	7	2	3	....	3	....	2	....	....	....	....	....	....	....	....	....
Alliance	18	8	....	....	8	....	....	....	....	....	....	....	....	....	....	....
Bryan	14½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Columbus	11½	5½	....	....	....	....	....	....	....	5½	....	....	....	....	....	....
Conneaut	....	....	....	....	6	....	....	....	....	....	....	....	....	....	....	....
East Cleveland	15	6	....	6	6	....	....	....	4–6	....	....	....	....	....	....	....
Elyria	14	....	....	4	....	....	....	....	4	....	....	....	....	....	....	....
Findlay	15	....	....	....	....	....	....	10	....	....	....	....	....	....	....	....
Lakewood	6.1	2.8	....	3.4	....	....	....	....	1.7	....	....	....	....	....	....	....
Marietta	....	12	....	....	6	....	10	....	....	....	....	....	....	....	....	....
Orrville	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Portsmouth	17	....	....	4	3	....	....	....	3	4	....	....	....	....	....	....
Salem	....	....	5	....	4	....	....	....	....	....	....	....	....	....	....	....
Springfield	12	8	....	6–8	....	....	....	....	8	....	....	6	12	....	....	....
Toledo	6¼	....	1.4	2.4	0.6[1]	....	....	....	....	....	....	1	6	....	....	0.5
Warren	14	10	....	....	10	....	....	....	....	....	....	....	....	....	....	....
Weston	....	....	....	14	....	....	....	....	....	....	....	....	....	....	....	....
Youngstown	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oklahoma:																
Ada	....	8	....	....	5	....	....	....	....	....	....	....	....	....	....	....
Chickasha	12	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....
Oregon:																
Astoria	15	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Rosebury	18	18	....	....	....	....	....	....	....	....	....	....	....	....	....	....

Pennsylvania:																
Altoona	15	4–10	....	....	....	....	....	....	....	....	....	10	....	....	....	....
Bangor	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....
Beaver Falls	12	....	....	....	8	....	....	....	8	....	8	....	....	....	....	....
Blairsville	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carlisle	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton	....	1½	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Franklin	13	8	....	....	8	....	....	....	....	....	....	....	....	....	....	....
Galeton	....	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....
Girardville	....	12	....	....	....	12	....	....	....	....	....	....	....	....	....	....
Jeannette	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....
Oil City	18	....	....	....	....	14	....	....	....	....	....	....	....	....	....	....
Philadelphia	8	5	8	8	....	....	8	....	8	....	....	....	....	8	....	8
Quakertown	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....
Reading	12	8	....	8	10	....	7	12	10	....	....	7	....	....	....	....
Scottdale	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Turtle Creek	....	....	....	....	9	....	....	....	9	....	....	....	....	....	....	....
West Berwick	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....
Rhode Island:																
Woonsocket	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Dakota:																
Madison	19	8	8	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee:																
Clarksville	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....
Jackson	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....
Johnson City	....	....	....	....	13	....	....	....	....	....	....	....	....	....	....	....
Nashville	15	....	....	....	5½	....	4	....	....	....	....	....	....	....	....	....
Paris	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Texas:																
Amarillo	10	4	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Austin	20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Brenham	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Denison	10	....	....	10	....	....	....	....	10	....	....	....	....	....	....	....
Georgetown	18	20	20	....	....	18	....	20	....	....	....	....	....	....	....	....
Houston Heights	16	....	12	12	....	12	....	....	....	....	....	....	....	....	....	....
San Marcos	20	14	....	....	10	....	....	....	....	....	....	....	....	....	....	....
Victoria	15	8	14	10	....	....	....	....	....	6	....	....	....	....	....	....
Utah:																
Logan	20	....	8	....	6	....	....	....	....	....	....	....	....	....	....	....
Ogden	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Salt Lake City	5½	1½	....	1	2½	4½	1	....	7½–2½	....	2½	....	....	14	5½	....
Vermont:																
St. Johnsbury	....	....	4½	4½	....	....	....	....	....	....	....	....	....	....	....	....
Virginia:																
Covington	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Harrisonburg	....	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....
Newport News	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Roanoke	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Washington:																
Bellingham	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ellensburg	....	50	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Olympia	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Puyallup	11	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
Seattle	7	....	....	1.3	....	1.6	1.25	3	....	....	....	....	5½	....	1¾	....
Tacoma	8	3	....	2½	....	....	....	....	3	2½	....	2½	....	....	....	....
West Virginia:																
Elkins	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fairmont	15	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wheeling	....	8	....	4	....	....	....	....	....	....	....	....	....	....	....	....
Wisconsin:																
Antigo	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Appleton	15	....	....	5	....	7	....	....	....	....	....	....	....	....	....	....
Ashland	12	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Fond du Lac	12	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Manitowoc	15	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Merrill	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Milwaukee	7.4	1¾	....	1¼	....	....	1¼	....	1.4	....	....	....	....	5¾	2.1	....
Oshkosh	12	8	8	8	....	....	....	....	....	....	....	....	....	....	....	....
Rhinelander	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Superior	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

[1]Aerial.

The WEEK'S NEWS

The Scranton Street Department Strike Ended—The Road Situation in New Jersey, Massachusetts and Pennsylvania—Sewage Disposal Practice in Iowa Found Poor—Cincinnati Raises Water Rates—Contend Over "Readiness-to-Serve" Charge in Toledo—Firemen Threaten Strike—New York Firemen Exhausted by Alarms in Zero Weather—Cities Vote for Commission and Against City Manager—City Manager Charter Law of New York Upheld—Pittsburgh Street Car Wreck Kills Score.

ROADS AND PAVEMENTS

Scranton Street Workers' Strike Ended.

Scranton, Pa.—The strike of the 255 employes of the public works department has been settled, the men receiving a substantial increase in wages. In spite of the attitude of mayor E. B. Termyn, the council finally decided upon the increase, after listening to S. J. McDonald, president of the Central Labor Union. According to the terms of the compromise, the street sweepers, the park laborers and the laborers on unpaved streets get a thirty-five cent increase, their wages going up from $2 to $2.35. The scale agreed upon for the other men provides $2.75 for teamsters; chauffeurs, $3; blacksmith, $3.50; helpers, $2.25; repair men, $3; assistants, $2.75; painters, $3.20; pavers, $2.50; sewer repair men, $2.80; sewer men, $2.50; drill runners, $2.80; quarrymen, $2.50; ashes and garbage collectors, $2.50; sewer laborers, $2.40; concrete mixers, $2.40.

New Jersey Road Law Upheld by Court.

Trenton, N. J.—The constitutionality of the Edge road act, providing an estimated revenue of $15,000,000 for road purposes during the next five years, has been upheld by the supreme court. The opinion by justice Bergen disposed of all the constitutional questions raised in the three consolidated litigations attacking the act and held that all of them were without merit. The substance of the findings of the court were that the title of the act is not defective; that first and fourth class railroad property is not subject to the tax imposed, but that this does not render the act invalid; that second-class railroad property comes within the purview of the act and is properly subject to taxation under it; that even though the Society for Establishing Useful Manufactures may have an irrepealable contract exempting it from local taxes this fact would not invalidate the act, and that bank stock is taxable under the act, which would not be invalidated by the fact that local assessors may have failed to include it in their returns. Governor Edge expressed gratification upon learning of the Court's decision. At about the same time the governor received a letter from General George W. Goethals, saying that no matter what his duties might be at Washington his services and advice would still be at the disposal of New Jersey to the extent that he might be able to give either. In the face of two decisions from the supreme court, one by chief justice Gummere, refusing to grant a writ of certiorari to review the road act and the present decision, governor Edge said it would be useless to attempt to still further retard work on the highway system. If an appeal is taken, however, the governor said he will ask for a special session of the Court of Errors and Appeals in order that the work may not be delayed any longer than is absolutely necessary.

In discussing the provisions of the act, justice Bergen held that the road tax is clearly a state tax, although levied upon property classified as property upon which municipal taxes are "assessed, levied and collected." The court then considered the contention that the title of the act is defective because it applies to all real and personal property, while the body of the act limits its application to property upon which municipal taxes are levied. Remarking that the title does not read "all" real and personal property, justice Bergen said that even if it did, it would not be open to objection.

Consideration was next given the argument that the act was invalid, as not including all railroad property, which has been divided into four classes, on the first and fourth of which a direct tax is laid in which the municipalities take no part and which is applied by the state for its own use. The third class is admittedly subject to the act; its applicability to second-class railroad property was disputed. Disposing of the point involving first and fourth class property, justice Bergen said there is no legal rule better settled in this state than that the classification of railroad property for the purpose of taxation by a special scheme does not violate the constitution.

One of the most important points raised in the litigation involved was the inclusion of second-class railroad property in the law. On this question justice Bergen said in part: "In each of the three cities involved (Newark, Jersey City and Passaic), the value of second-class railroad property, as fixed by the state board, was included in the ratables, and the rate of taxation computed on that basis, so that if this class of railroad property is not within the law, that is, not property upon which municipal properties are assessed, levied and collected, then each municipality, having within its borders second-class railroad property, would be required to pay to the state on account of road taxes, more money than could lawfully be collected, and to that extent the assessment would be unjust."

After outlining the method of levying and collecting the tax on second-class railroad property, justice Bergen said: "Substantial features of the local property of railroads upon which taxes are thus raised for strictly municipal purposes, bring such property within the classification of the road tax act, by which the Legislature described the entire class of property subject to such tax by its general characteristics for purposes of taxation, and not by special features that bore only upon the convenience of collecting. A classification that was valid for this latter purpose might not be valid for the former object. It is fundamental that the validity of a classification depends upon the legislation that is proposed to be based upon it, hence the corrolary is that a classification shall be considered in the light of the proposed legislation, especially when necessary to render such classification constitutional. In our opinion second-class railroad property is taxable under the act of 1917."

Justice Bergen held there is no merit in the contention that the road act does not include franchises of street using public utility corporations. Such franchises, he said, are either exempted by reason of classification from local taxation or subject to the act under consideration, and if, under the act, they are subject to local taxation and have been omitted by the local assessors, that is an error in execution of the law, which does not make it unconstitutional.

The court found no reason to doubt the capital stock of banks and trust companies are subject to taxation under the road act. The valuing of this property and the assessment and collection of the tax, the court pointed out, is all performed by the local officers, and the mere fact that the statute fixes the rate, does not make it a state, as distinguished from a municipal tax.

War-Time Road Building in Massachusetts.

Boston, Mass.—Highway construction on a war basis is the feature of the tentative plans for next year's work decided upon by the state highway commission. There will be very little scenic road construction and almost no work, except in maintenance, upon the routes that can be singled out as devoted largely to pleasure motor touring. For the time being the development of the road system of the state along these lines will be abandoned. Instead of spending money upon extension of the highways into new sections of the state, constructing mountain roads in the Berkshires and the like, it is the present intention to put almost all the road money into the roads already built, whose importance from military and commercial standpoints is thoroughly established. These roads will be made wider and more durable, the curves will be improved, the bridges strengthened, and the surface kept in the best of condition. The commission does not contemplate attempting to build a purely military type of road, with a hard surface of 24 feet and wide shoulders on both sides for the passage of infantry. Such a type of construction would be beyond the financial ability of the commission's ordinary revenue and does not seem necessary. But the roads that lead between the principal cities of Massachusetts and towards the large cities of adjoining states that lie along the coast and that radiate from important military centers will be widened in many places and made more substantial. In making these plans the

commission is not controlled primarily by the prospect of the movement of troops over the roads, but by the increased use to which these roads will be subject, under war conditions, in the movement of freight in heavy motor trucks. Already the railroad congestion has made it necessary for a large number of shippers to turn to motor trucks for long-distance hauls of merchandise, especially in cases where immediate delivery is required. New work for this year has been finished on the state highways. Although the commission and its contractors have had to labor under most difficult conditions in regard to the supply of labor and materials, and has had to meet much higher prices, it has succeeded in building a mileage almost equal to that constructed in 1916, the mileage of new road built this year being 53½ as compared with 54 last year. There are now 1,208 miles of state highway in Massachusetts.

It is interesting to note at present that the so-called Seretto contract, for making which the commission was much criticised last spring, has proved of great value in enabling the commission to carry on its road work. This contract assured the commission of a supply of labor, when it would have been unable to obtain it had it not been provided for by this contract, according to which Seretto was to be put on a percentage of the cost, with six cents per cubic yard of excavation as fair compensation for him, and a corresponding sum for ledge work. He was to furnish superintendent, foremen, laborers, small tools, teams, camp outfit, and so on, and to make the original payments to his men. The state was to have its own bookkeeper on the job to check up the items and was to repay him all of this actual cost which he paid out, plus the six cents, or its equivalent, for his personal remuneration. Old contractors predicted that the system would prove more expensive to the state, but highway commissioner Kemp says that the results have abundantly justified the new departure. Seretto's contract was to cover work on at least four, and possibly seven, of the routes in the five western counties, which were to be built under the well-known western counties' special act, which was passed two or three years ago. It was estimated that the average cost per cubic yard of excavation would be 60 cents and that 10 per cent on this would be sufficient margin for the contractor. If he could keep the cost down to 50 cents, and still get his six cents, then he would be getting 12 per cent of his outlay; but if the cost rose to 80 cents then he would suffer accordingly. Consequently, with this inducement, the contracts have worked out to the ample satisfaction of the commission. Later, when they advertised several other jobs, with substantially the same specifications, to be done under the old system, the commission could not get from any of the bidding contractors any figures which were in the same class with the cost by the Seretto method, with one exception, and that was materially higher than would have been the cost under the new plan.

Separate Grading from Construction.

Harrisburg, Pa.—It is possible that the state highway department may let contracts for grading work separately from regular road construction next year. This subject is receiving serious consideration because of the advance in price of materials, the difficulty in obtaining labor and the car service interruptions, caused by the priority order of the government. The specifications are to be studied and taken up very soon for determination. Thus far only one or two contracts have been let for grading as a separate proposition, and observations have been made on them. In a number of instances county and borough authorities have favorably commented upon the plan for separate contracts. Something like twenty-six counties have agreed to co-operate with the state in road work on a "fifty-fifty" basis and sixteen boroughs have accepted invitations to unite in improvement of streets which are on the line of state highways. The department announces that it will hereafter make a charge of $2.50 for sets of plans and specifications for road work. Heretofore plans were to be seen at offices of engineers of the department. Under the new arrangement plans may be bought outright by interested persons and studied at their offices or homes. The announcement says that the price is at cost. The department recently announced that provision is being made in all contracts by the state highway department for road construction whereby the contractor would be relieved in the event that time is lost and completion of the improvement delayed through inability to obtain deliveries of materials because of the priority order in the use of open-topped cars on the railroads. In a dozen counties the state was compelled to suspend construction work of its own and maintenance operations generally were seriously interfered with where the department was dependent on transportation of materials by rail. Where the stone needed could be obtained from quarries along the highways and prices were reasonable work went on as long as the weather permitted. Repair work on the main highways in use for motor truck traffic and which are expected to be much traversed this winter has been rushed, and trucks have been pressed into state service to haul stone and other materials.

SEWERAGE AND SANITATION

Sewage Plants in Poor Condition.

Des Moines, Ia.—In the 2,300 cities, towns and villages of Iowa there are about 450 water works plants, 180 sewage systems and 100 sewage treatment plants, according to J. H. Dunlap, associate professor of hydraulics and sanitary engineering at the state university, who was engaged last summer by the state board of health to inspect water works, sewers and sewage treatment plants of the state. "Of the thirty-seven plants visited during the summer only three can be said to have been in good condition," the engineer declares. "All three of these plants had features which were needing imediate attention, but in general they were giving excellent results. The other thirty-four plants were either not being operated properly or were so badly overworked as to make first-class operation impossible." Professor Dunlap suggests two possible means of relieving this state of affairs. Either a representative from the state board of health must be permitted to visit all the sewage treatment plants and supervise their operation or some one individual in each town and city having a sewage treatment plant must interest himself in the plant and see to it that a competent man is in charge. "If no local man can be found who can take full charge, then an expert from outside should be engaged to supervise the operation of the plant," Professor Dunlap says. "At relatively small expense good results can be secured in this way. One competent sanitary engineer could be engaged to do this work for several towns. The expert might place a local man in direct charge and himself supervise the operation of the plant by making an occasional visit to it at the critical times of the year. The small expense involved is in reality a saving if the future cost of present neglect is taken into account," the university engineer concludes.

Systematic Infant Welfare Work.

Cleveland, O.—A system by which it is intended to have the city assume direct responsibility for conditions connected with proper care of expectant mothers is soon to be put in operation by the city health department in cooperation with Western Reserve university obstetrical department. The plan has the approval of city health commissioner Bishop; Dr. R. A. Bolt, chief of the bureau of child hygiene, and Miss Cecelia Evans, director of the university nursing district. The proposed work is expected to achieve four principal objects: 1—Reduce the number of still births. 2—Decrease the number of infants' deaths, due to prenatal causes. 3—Lower the number of deaths at confinement. 4—Lay the foundation for better health of babies and mothers. "Proper prenatal care and proper obstetrical services will prevent probably 60 per cent of fatalities in confinements," says Dr. Bolt, child hygiene chief. He said that in the first ten months of 1916, of 15,752 birth, 612 were still births or born dead, and during the same period in 1917, the still births numbered 604, ont of 17,615 total births. He said

comparison between the two periods showed only a slight improvement. During the whole of 1916, Dr. Bolt said, the total number of fatalities among babies, directly traceable to prenatal conditions, numbered 1,383. Of these, 749 were dead at birth and 634 died within two weeks of birth. He declared experience had shown that more than a majority of these cases were preventable. During the same year, he explained, 123 mothers died of the results of child birth, and in fifty-nine cases death was caused by infection—a condition which could have been avoided with modern and scientific care. Dr. Bolt said while the death rate among babies under one year of age, from gastro-intestinal and other diseases to which infants are particularly subject, have slightly decreased in recent years, the death rate here of mothers, and infants during the first few weeks of life, has not diminished, but has even increased somewhat. A preliminary trial of the plan is to be made in the so-called university nursing district, which embraces the center of the city where exist practically all of the conditions that will be met in outlying districts. Dr. Bolt said that this territory is particularly well fitted as a starting point because of the location within its boundaries of the infant welfare center, the E. 35th street maternity dispensary and the nurses' training school.

According to the outlined program, the infant welfare center is to be utilized as a maternity welfare center and clearing house for all maternity cases found in the district, except those now cared for in the Western Reserve maternity or St. Luke's dispensary. Public health nurses in this district are to refer all maternity cases for primary examination to this center. Student nurses in the district are to be given instruction in prenatal work at the center, followed by a more intensive study at the E. 35th street maternity dispensary.

The nurses are to investigate social and economic conditions in all cases, and all information obtained is to be recorded, so that the physician in charge at the maternity welfare center may decide upon proper treatment of each case. Where persons are financially able to employ a private physician, prenatal care will be given in cooperation with such doctor. Where a private physician cannot be employed, the mother will be cared for at the center up to confinement, when the case is normal, or she will be referred at once to the dispensary, when the case is complicated or serious.

Particular attention is to be given to cases in which midwives are engaged. "The proposed maternity welfare center," Dr. Bolt said, "will be considered simply as the first unit of a city-wide plan to extend this public service gradually to all the health centers in the city. The work is to be unified under a bureau of maternity welfare of the division of health, with an obstetrical chief, selected by the commissioner of health on the nomination of the professor of obstetrics of the Western Reserve medical college, who will act as expert consultant. Assistants will be appointed by the chief of the bureau, the commissioner of health and the consultant."

City May Remove Trees Choking Sewers.

Tacoma, Wash.—The city of Tacoma and Charles D. Atkins as commissioner of public works have won the final decision in the suit against the city started by a property owner for treble damages because the city removed two poplar trees from the street in front of the property. The city contended that the roots from two poplar trees choked up the sewer pipes in 1913 and again in 1917, forcing the city to go to considerable expense in taking the pipes up and replacing them. The complainant asserted that the city did not have a right to remove the shade trees. The supreme court held that the case was a question of the rights and powers of the city in the city's streets and found for the city.

WATER SUPPLY

Water Rates Raised By Cincinnati.

Cincinnati, O.—Water rates to all consumers have been advanced 25 per cent beginning with the new year. The minimum monthly charge will be increased 30 to 40 cents. The new scale means an advance of from 8 cents to 10 cents a hundred cubic feet for metered service. Service director Hornberger made the announcement following a series of conferences with mayor Puchta and J. A. Hiller, general superintendent of the water works, at which the necessity of additional revenue was urged. Service director Hornberger estimated that $120,000 a year will be added to the revenue of the water works department under the new scale of rates. The 25 per cent increase will also affect unmetered services. For services in the unincorporated villages outside city limits, the meter rate is fixed at 11 cents per 100 cubic feet, a minimum of 50 cents being charged, while 12½ cents per 100 cubic feet will be the rate for consumers in incorporated villages.

First Year of Municipal Operation Successful.

Santa Monica, Cal.—Operating expenses of the municipal water department for the first year were only 49 per cent of the receipts, according to a report prepared by superintendent Walter S. Dole. Old machinery, plants and site rendered superfluous by new equipment are worth nearly $100,000, which can be turned into the city treasury when the property is sold. The net profit is $39,598.92, despite numerous expenditures for improvements. Superintendent Dole says that the cost of operation will be greatly reduced during the present year.

Municipal Plant Rates Not Subject to State Regulation.

Dallas, Ore.—The state supreme court has adhered to its original opinion, that the water plant at Dallas is owned by the city, and therefore its rates are not subject to regulation by the public service commission. After the commission had issued an order reducing rates, H. V. Gates appealed, contending that he was merely operating the plant under a lease and the city was the real owner. The court, however, held that the city of Dallas should not be compelled to pay the cost of litigation, but that it should fall on Gates.

STREET LIGHTING AND POWER

City Loses in Franchise Case.

New York, N. Y.—Justice Delehanty of the supreme court has handed down a decision dismissing the suits brought by the city against the Central and the Northern Union Gas companies and the Westchester Lighting Company, the three companies supplying the Bronx. The city had sued to deny the Bronx companies the right to lay their pipes in the streets on the ground that they had not properly obtained the necessary franchises. Justice Delehanty finds that all of the companies in question had acquired their franchise rights from their predecessors, which had in turn obtained them from the various local governing bodies. The justice finds that the companies have been using the streets for the last half century and that they have regularly been paying their franchise taxes to the city. He intimates that the city had no business bringing the ouster suits, anyway, as that was a matter for the state to take up, if such sovereign power thought the companies were operating without due process of law.

Arbitrators to Decide on "Readiness-to-Serve" Charge.

Toledo, O.—The Northwestern Ohio Natural Gas Co. will receive its 35 cents monthly readiness-to-serve charge temporarily, according to a decision by city counsel. The 48,000 Toledo gas consumers will pay about $201,600 every year in addition to the regular rate for natural gas. The ready-to-serve charge began Dec. 26 and will continue until a board of arbitrators decides the charge is unreasonable. If the board decides the charge is reasonable it will be continued indefinitely. An ordinance granting the gas company permission to charge 35 cents a month for service in addition to the regular rate for gas, was passed by council and another repealing ordinance which fixed the rate at 35 cents and prohibited a service charge. In return for the passage of these two ordinances the gas company is to withdraw its schedule filed with the Ohio public utilities commission, establishing a rate of 42 cents for gas. If the public utilities commission agrees to substitute the service charge proposition for the 42-cent schedule already on file, Toledo's gas controversy is over. The gas company officials expect the city councils of Maumee, Perrysburg, Bowling Green and North Baltimore to follow Toledo's lead. The ordinance provides for the selection of a board of arbitrators to investigate the gas company and appraise the value of its property. If this board decides that a 35-cent readiness-to-serve charge is unreasonable, the company will refund the amount which has been paid by consumers under that charge. One member of the board will

be selected by the mayor of Toledo, another member by the gas company and, if these two members fail to agree on any point, a third member will be appointed by the governor of Ohio. The ordinance stipulates that the third member must not be a resident of Lucas or Wood counties. The company officials objected to having the member be a local man, saying they desired the board to be "free from local influence." Each party to the agreement must appoint its member on or before Feb. 1, 1918, and if either side fails to appoint by that time, the other side may go ahead and make the appointment. The company insisted throughout negotiations that it should not agree to bind itself to any rate, but said the council could abolish the service charge at any time. The matter was adjusted by incorporating in the ordinance a clause which automatically suspends the service charge whenever the company charges more than the prevailing price for gas.

Allow Twenty Per Cent Power Rate Increase.

Bluefield, W. Va.—Upon the agreement of representatives of the Appalachian Power Co., of Bluefield, and a number of consumers of power, who had appeared as protestants against the company's application to increase rates, the public service commission has entered an order permitting an increase. The rate raise will be twenty per cent over the rates now being charged to all consumers using over fifty horse power of current, the increase to be effective from Dec. 1 and run to Jan. 1, 1919.

FIRE AND POLICE

Military "College" for Firemen.

Ayer, Mass.—A military college for firemen has been opened at Camp Devens under the direction of lieutenant John F. McAree, chief of the cantonment's fire department. Twenty-five picked men of the half hundred that compose the fire-fighting forces at the camp commenced study of chemistry, including explosives, and courses in French, German and Italian. This latest innovation in the training of New England's national army division is intended, according to chief McAree, who was a captain in New York city department, to prepare the men for any emergency, including transfer for duty abroad. All the men in the camp's permanent department are former members of fire departments in seventeen New England cities and towns. The new college will also give the men a chance to take a course in practical laboratory work, and it is the intention to fit them so that when they return to civil life they will be available for higher positions in the fire departments which they left when they were drafted for military service.

Firemen's Strike Threat Because of Inexperienced Board.

Danvers, Mass.—The members of the town's fire companies, totalling about a hundred, have decided to resign in a body if the two new members of the board of the engineers recently appointed by the board of selectmen take office. As a result, the board of selectmen addressed letters to the mayors of Salem, Peabody and Beverly, asking the executives of those cities to render what aid they can to Danvers in event of fire and the town being without the protection of a department. The announcement some time ago that Frank W. Budgell and Thurman Leslie were to be made members of the board of fire engineers, in place of Michael H. Barry and Daniel W. Wheelwright, caused a storm in local fire circles. The men to be dropped are men of experience in fire matters, while it is claimed Messrs. Budgell and Leslie have not had such experience. The selectmen threaten action by the district attorney if the men strike. Chief Barry considers the action of the selectmen in appointing the new board of fire engineers as illegal, as do the other members of the board. The old board intends to stand its ground and serve the town as usual. Chief Barry says that the law provides that the fire engineers must attend all fires, and that the firemen must take their orders from the engineers. The engineers are the first to enter a burning building, ascertain the extent of the fire and whether the building is safe for the firemen to enter, and then give orders as to how the fire shall be handled. It is upon their judgment and experience that the firemen depend, and upon which they frequently risk their lives. Chief Barry inquires if the citizens of the town blame the firemen for not desiring to trust their lives, or even to take orders at a critical time, from a group of inexperienced men, who do not even know a male from a female coupling.

Town Hall Burned.

West Boylston, Mass.—The town hall in West Boylston was completely destroyed by an early morning fire, entailing a loss on structure and furnishings of between $25,000 and $30,000. There was insurance upon building and contents of $15,000. The cause of the blaze, which apparently originated in the basement of the building, is not known. When the residents in the village were aroused the building was even then engulfed in the flames and the efforts were largely directed toward the saving of other buildings, a shower of sparks from the burning structure falling upon a wide area. Had it not been for the snow upon the roofs it is probable that many dwellings would have been the prey of the flames. As it was several houses caught fire but the flames were quickly subdued. The destroyed building was a comparatively new structure, replacing the town hall which was within the area seized by the Metropolitan water and sewerage board for the Wachusett reservoir.

Hundreds of Alarms on Record Cold Days.

New York, N. Y.—The New York fire department has seldom had a busier twenty-four hours than those of Dec. 30, one of the coldest days in the city's history. In the first sixteen hours of that period, from midnight Saturday till 8 P. M., there were 123 fire alarms in Manhattan and the Bronx and 125 in Brooklyn and Queens. Altogether, during the whole day some 300 alarms were turned in from the whole city. About two-thirds of these, however, came from automatic systems, and were due to the snapping of wires or freezing of pipes in automatic sprinkler systems. While these alarms were only technically "fires," they had two serious results. One was the damage done by water from bursting pipes, which insurance men estimated at a total running into hundreds of thousands; and the other was the added burden laid on firemen, who had enough to do answering alarms for real blazes. Of the real fires the great majority were due to the cold weather. Most of them were due to explosions following the thawing out of frozen steam pipes or frozen water-backs in stoves. Overheated ranges in some cases set fire to nearby hangings and woodwork; oil stoves exploded, and one blaze in Brooklyn was caused by the overturning of a charcoal burner. One death and perhaps a dozen serious injuries occurred in various parts of the city. Firemen were kept going, with hardly a moment of rest all day long; indeed, it was said that battalion chief Owen McKernan was not out of his automobile, except when supervising the actual fighting of a fire, from 5 o'clock in the morning till 10 at night. Serious fires were few, but those that did occur necessitated not only the drawing together of great numbers of fire fighters with much apparatus, but the shifting of other companies to cover the areas left bare, and these companies always had to be withdrawn from districts where alarms were coming in every few minutes. The slippery condition of the ice-covered streets delayed the apparatus in going to blazes, and the end of the day with so little damage done in proportion to the number of alarms was a tribute to the amazing activity with which the fire department covered the town despite the handicaps of unusual weather and an enormous amount of work. The situation was most serious early in the evening when a big livery stable fire in east Harlem resulted in the turning in of five alarms, calling together all the apparatus north of Fifty-ninth street, in Manhattan, at the same time that a three-alarm fire was burning in the Long Island Railroad freight yards in Long Island City. While the Harlem fire was still burning fiercely another blaze broke out within four blocks of it, and because there

was no apparatus left in northern Manhattan to answer the first alarm a second had to be turned in, bringing engines from the Bronx. The most serious fire of the day was in the stable, due to oil boiling over when it was being heated by a watchman. As a result 250 horses kept in the basement and two upper floors of a five-story brick building were all destroyed. For a time the entire block was threatened and hundreds of families of the crowded tenements were cleared out by the police into the bitter cold of the streets. Some were given refuge in station houses. An adjoining stable and garage was damaged but all horses and trucks were taken out and the building saved from destruction. In the meantime firemen in Long Island City were busy with the blaze in the freight yards of the Long Island railroad, which did damage estimated at about $125,000, and destroyed the bills of lading and records of goods contained in nearly a thousand freight cars which themselves escaped the flames. The fire broke out apparently in the office of the freight transfer station, a corrugated iron building some 200 feet long and 100 feet wide. It was discovered by two brakemen on passing cars. By the time the yard fire department got there the interior of the building was all ablaze, and three alarms were at once turned in for the city department in order to save the hundreds of freight cars within reach of the fire. Quick work by switching crews got all but two of these out of the way. There were about 200 alarms the next day, and both men and apparatus are still recovering.

Fire in Ship Plant on Meadows.

Kearny, N. J.—A fire in a plant adjoining the structures of the Federal Shipbuilding Company on the Kearny meadows threatened seriously for a time the work being rushed on shipping by the government. The fire in the office and storehouse of the Post & McCord Company was visible over a wide stretch of country. The concern has been working day and night turning out steel plates and other parts for the shipbuilding company plant. The buildings which were destroyed were of wood and intended as temporary structures, but in them were valuable drawings and plans. Firemen were called from Jersey City to help those from Kearny and engine 9, of Jersey City, lost its smokestack while speeding under an overhead crossing. Permanent water mains had not been laid and the temporary system was utterly inadequate. The firemen also were bothered by a temperature of 7 degrees below zero and a brisk wind, but they prevented flames from spreading to the federal plant. Fire chief C. W. Greenfield of Kearny started an inquiry to discover the cause of the fire.

Fire Trucks Must Heed Speed Limit.

Anderson, Ind.—The state law limiting the speed of motor vehicles in cities applies to fire trucks as well as other vehicles, circuit judge Pence has ruled, and Anderson's fire trucks will not be allowed to exceed twelve miles an hour in making runs to fires. The ruling was made in court in the case of a complainant, who sought judgment for damage done his property when fire chief Alcord ran into his porch while on the way to a blaze. The plaintiff was awarded $30.

Fight Big Fire in 500,000-Ton Coal Pile.

Stockton, Ind.—A fire in the coal pile at the storage yards here of the United States Steel Corporation, which had been dormant for weeks, became active again and systematic efforts were made to check it. The pile contains about 500,000 tons and is half a mile long. Steam arose from the coal the length of two city blocks and at places flames broke out. Adjoining coal piles containing hundreds of thousands of tons of coke and bituminous coal were safeguarded from the flames. Although the coal pile is on the shore of Lake Michigan, there is no water pressure to fight the fire there and construction crews had to put in a temporary pumping station, while other gangs laid pipelines. A fleet of the heaviest steamboats from the Gary steel plant, as well as several freight trains from the Kirk yards of the steel trust were sent to Stockton. Huge shovels were used to dig gaps through the coal pile so as to segregate it into units, while trainload after trainload of the less damaged coal on the top of the pile was removed. Though fires have attacked the reserve piles of the several steel companies in the Calumet district several times, they never proved to be serious. The present fire seemed to have been quenched by the cold and zero weather, but with the thaw and warmer weather the pile suddenly began to show signs of life.

GOVERNMENT AND FINANCE

City Manager Plan Defeated by Two Cities.

Salina, Kans.—The proposition to adopt a commission form of government, with a city manager, has been defeated here by a substantial majority of 208. The vote was light. This is the second time Salina has rejected a commission government plan.

Wymore, Neb.—The city has defeated the city manager plan by a vote of 176 against and 96 for the plan. Wymore is the first town to vote on the plan since the new law was passed by the state legislature. The opponents of the plan claimed that if a city manager was elected the municipal lighting plant would be done away with and this is thought to have influenced the vote.

New York City Manager Law Held Constitutional.

Albany, N. Y.—The optional city government law enacted by the legislature of 1914 is constitutional, according to a decision by the Court of Appeals. The decision was made in a taxpayer's action which was brought to restrain the cities of Watertown and Niagara Falls from organizing under what is commonly known as the city manager form. The court brushed aside the allegations that the enactment of the law was violative of the state constitution in that it was too broad a delegated legislative power or that the legislature had parted with any of its constitutional functions in permitting cities to select and operate under this new form of government. The optional city government, the Court of Appeals held, was not passed in contravention of any federal or state constitutional provisions. The opinion of the Court of Appeals pointed out that the contention that the legislature was giving cities powers of self-government which were in conflict with the constitution could not be justified. In conclusion the Court of Appeals said: "The whole trend of modern thought and recent legislation is toward vesting in each municipality the management of its local affairs, and I have been unable to discover any valid reason why the present act, which is a step in that directon, should not be given a fair trial without interference from the court. The act is not an attempt upon the part of the legislature to shirk its duty or to delegate to another body the power vested solely in it. On the contrary, it is to permit each locality to determine for itself the form of government which it will have, based upon modern ideas rather than upon a form of government which has been tried and in some respects at least found unsatisfactory. I, for one, am unwilling to subscribe to the doctrine that the legislature had not the power to do this."

Watertown, N. Y.—While the city manager form of government opposed by the voters in 1915 is validated by the decision of the Court of Appeals, it is not yet definitely known what the effect will be on the coming administration of the city. Early this year the present suit was instituted by city officials whose terms of office had not expired and who would be put out of their positions by the new form of administration. The case was heard in special term by Justice Emerson, who considered the law of 1914 irregular and declared it unconstitutional, maintaining that the decision of the taxpayers for a change in government was void and that the old form should remain in force. The appellate division of supreme court, at Rochester, sustained the ruling of the trial justice. The case went to the Court of Appeals this fall. Acting under the decision of justice Emerson, as sustained by the higher tribunal, party organizations and election officials proceeded under the usual custom in preparing for the recent election. No provision was made to select commissioners. The

usual nominations for city offices were made and mayor Isaac R. Breen and his administration was retained. The course to be followed is not known. It is possible that the administration-elect will continue. It may be that a special election must be held at once to choose commissioners under plan C of the city manager scheme, and that the present administration will conduct affairs pending the new government. It seems more likely that the new administration will remain in for the year, and that commissioners will be chosen at the next general election in 1918. Special legislation will be necessary to get the city out of the tangle. Plan C, adopted by Watertown, provides a mayor and four commissioners to be elected by the people. Each is to receive a salary of $750 per annum. They have power to choose a city manager and fix his salary. The city manager is virtually the city executive. This change would not affect the board of education, which is governed by special legislation, or the library board. All other city boards are dissolved and all other city departments brought under the direct supervision of the commission.

Niagara Falls, N. Y.—The city manager plan of government, plan C, which has been in operation here since January 1, 1915, has been declared constitutional after a number of reverse decisions. It is understood that the effect of the decision of the court of last resort will be that the men elected members of the city council two years ago will continue as such, and that the men elected to office last fall under the provisions of the old federal charter will not be inducted into office. This decision will further mean an election for commissioners, next year, when otherwise no city officers would be elected. The terms of councilmen W. Acheson Smith and William H. Gillett expire with this year, and before the court action was brought these two men had announced that they would not accept renomination. Under the provisions of the public officers law, however, they will continue in office until their successors have qualified. In the ordinary course of events their successors would be chosen at the general election in November, 1918. It might be possible to hold a special election for that purpose, but such special election would have to be called by the governor of the state. It is not known what effect, if any, the decision will have on the tenure of office of the city manager, Ossian E. Carr.

Two Cities Adopt Commission Form.

Rahway, N. J.—Commission government rule was adopted in Rahway by a majority of 234. The total vote cast was 1,309. Of these 766 were for commission, 532 against and eleven ballots were rejected. It was the third time that a vote for commission rule had been submitted, first in 1911, when 1,370 votes were cast, and again in 1913 when the vote was 1,189.

Corsicana, Tex.—At a special election this city has approved the new charter proposed for consideration by the voters. The new form of administration is the commission plan.

TRAFFIC AND TRANSPORTATION

Many Killed and Injured in Car Wreck.

Pittsburgh, Pa.—Twenty were killed and scores were injured, several seriously, when a runaway street car swept through a tunnel and crashed into an iron pole at the end. Several investigations are being made of the disaster and the motorman of the car is under arrest in the hospital. The motorman said that when he had gone about 500 feet into the tunnel he noticed that the car was gaining in speed and he attempted to stop it. The airbrake, however, refused to work and the handbrake was powerless. The reverse was applied but the overhead switch went off and the car ran on. The car, which was packed, crashed into the pole and about two-thirds of the roof was torn off. The car ran into the corner of a store. The motorman's testimony is different from that of the motorman of the car following. The latter said that the ill-fated car had stopped in the tunnel and because the conductor could not get out through the crowd, he had gone out of his own cab and put the trolley of the other car on the wire. Passengers gave still more incriminating evidence. They say that there appeared to be ill-feeling between the motorman and the conductor all through the trip. When the trolley left the wire the conductor asked the motorman to put it back but the latter refused angrily. When the trolley was replaced, according to the passengers, the motorman threw his controller over forcibly and in anger. In his version, the motorman denies that the trolley had left the wire and that the car had stopped.

"Skip-Stop" to Save Fuel.

Columbus, O.—The city council has given Columbus Railway, Power & Light company permission to eliminate alternate stops on all lines outside the business section. Harold W. Clapp, general superintendent of the company, stated that the adoption of this plan will save from 400 to 500 tons of coal per month. Mr. Clapp also asked that the proposal to reduce the evening service about 50 per cent. be authorized as an emergency measure. He promised that full service would be restored when conditions become normal. No action was taken on this request.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

"Municipal Affair"—Licensing Patrol Service.

(Cal. App.) Licensing and regulation of private patrol service of system within designated limits of city of Oakland is municipal affair, within Const. art. 11, § 6, investing municipalities with full power to legislate in all matters embraced within term "municipal affairs," uncontrolled by general laws.—Ex parte Hitchcock, 166 P. 849.

Police Government—Judicial Interference.

(S. D.) Courts will not interfere with municipal corporations in their internal police and administrative government, unless they are transcending their powers, or some clear right has been withheld, or wrong perpetrated or threatened.—City of Mobridge v. Brown, 164 N. W. 94.

Existence of Municipal Power—Judicial Decisions.

(Cal.) Any fair reasonable doubt concerning existence of municipal power is resolved by the courts against the corporation.—City of Long Beach v. Lisenby, 166 P. 333.

Traveling on Right Side of Street—Backing.

(Cal.) Ordinance requiring vehicles to travel on right side of street does not prohibit chauffeurs in congested districts from backing automobiles into limited parking space.—Sheldon v. James, 166 P. S.

Manufacturing District—Right to Use Streets for Foot Traffic.

(N. Y. Sup.) Although city district was almost entirely used for manufacturing purposes, pedestrians still possessed right to use streets therein.—Stanley v. Jay St. Connecting R. R., 166 N. Y. S. 119.

Assessing Pipe Line of Other Municipality—Basis.

(N. J.) Under 4 Comp. St. 1910, p. 5084 (§4a), 5085, assessment on pipe line belonging to another municipality must be based on value of land alone and not on improvements.—Jersey City v. Huber, 101 A. 378.

Delay in Questioning Assessment—Results.

(N. J.) Delay of municipal authorities in questioning assessment made by second municipality on pine line belonging to first municipality will not prevent subsequent attack on such assessment.—Jersey City v. Huber, 101 A. 378.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Jan. 8.—CANADIAN SOCIETY OF CIVIL ENGINEERS. Annual meeting, Montreal, Can. Secretary, Fraser S. Kieth, 176 Mansfield ntreet, Montreal.

Jan. 9.—NEW ENGLAND WATER-WORKS ASSOCIATION. Annual meeting, Boston, Mass. Secretary, Willard Kent, 715 Tremont Temple, Boston.

Jan. 12.—NORTHWESTERN SOCIETY OF HIGHWAY ENGINEERS. Annual meeting, Benson Hotel, Portland, Ore. Secretary, C. G. Reiter, Hillsboro, Ore.

Jan. 14.—AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Annual meeting, New York City. Secretary, F. A. Molitor, 35 Nassau street, New York.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Jan. 16-17.—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual meeting, New York City. Secretary, Charles Warren Hunt, 29 West 39th street, New York.

Jan. 22-24.—AMERICAN WOOD PRESERVERS' ASSOCIATION. Annual meeting, Chicago, Ill. Secretary, F. J. Angier, B. & O. Railroad, Mt. Royal Sta., Baltimore, Md.

Feb. 4-7.—AMERICAN ROAD BUILDERS' ASSOCIATION. Fifteenth annual convention, Hotel Statler, St. Louis, Mo. Secretary, E. L. Powers, 150 Nassau street, New York City.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

Feb. 7-9.—AMERICAN CONCRETE INSTITUTE. Annual convention, La Salle Hotel, Chicago, Ill. Secretary, H. B. Alvord, 27 School street, Boston, Mass.

Feb. 8-9.—AMERICAN CONCRETE PIPE ASSOCIATION. Annual convention, Sherman Hotel, Chicago, Ill. Secretary, J. H. Libberton, 208 S. LaSalle street, Chicago.

Feb. 15.—NEW JERSEY SEWAGE WORKS ASSOCIATION. Annual meeting, State House, Trenton, N. J. Secretary-treasurer, Frederick T. Parker, Guarantee Trust Bldg., Atlantic City, N. J.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d street, New York, N. Y.

April 15-17.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-19.—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

"The Engineering Societies"

The United Engineering Society, the Engineering Foundation and the Engineering Council have established a joint suite of offices in the Engineering Societies' Building in New York City, and have engaged as joint secretary Alfred Douglas Flinn, deputy chief engineer of the Board of Water Supply of New York City. The object of this action is economy of administration and development of co-operation between the national organizations of civil, electrical, mechanical and mining engineers, which some years ago formed the United Engineering Society. This society is the holding company for the four founder organizations, is landlord of the Engineering Societies' Building and holds title to the libraries of the society, forming the most important engineering collection in the country. The Engineering Foundation Board is a department of the United Engineering Society, to which is entrusted the administration of the Ambrose Swasey endowment for engineering research. The Engineering Council was organized last summer, having for its purpose "the proper consideration of questions of general interest to engineers and to the public, and to provide the means for united action upon questions of common concern to engineers."

Mr. Flinn was born in 1869 in New Berlin, Pa., and is a graduate of Worcester Polytechnic Institute He was a member of the engineering staff of the Metropolitan Water Works, Boston, Mass., and a lecturer on water supply and sewerage at Harvard. He then became connected with the New York Board of Water Supply and became department engineer in charge of the headquarters department, entrusted with the construction of the Catskill project. In August, 1914, he became deputy chief engineer of the board.

American Association for the Advancement of Science.

Section D, Engineering, of the American Association for the Advancement of Science, held a number of very interesting meetings at the Pittsburgh convention, December 28 and 29

The Friday morning session was held in Thaw Hall, University of Pittsburgh, and among the papers read were the following:

"The Scientific Principles of Building Codes," J. A. Ferguson, secretary-engineer, building code committee, city of Pittsburgh; "Relative Efficiency of Different Methods of Repairing Bituminous Macadam and Bituminous Concrete Pavements," George H. Biles, second deputy state highway commissioner of Pennsylvania; "The Efficiency of the Application of Cold Bituminous Materials for Surface Treatments on Gravel and Broken Stone Roads," Julius Adler, engineer of tests, Pennsylvania state highway department; "Economic Surfaces for Floors of Steel Truss Highway Bridges, Willis Whited, bridge engineer, Pennsylvania state highway department; "Present Status of Granite Block Pavements," C. D. Pollock, consulting engineer, New York City; "Rattler Tests for Paving Brick of Various Depths," William C. Perkins, chief engineer, The Dunn Wire-Cut Lug Brick Co., Conneaut, O.; "Motor Trucks and Long Distance Highway Transportation," Maurice B. Greenough, chief engineer, National Paving Brick Manufacturers' Association, Cleveland, O.; "The Construction and Maintenance of Highways Under War Conditions," Arthur H. Blanchard, consulting highway engineer, New York City

On Friday afternoon a joint session was held in the Mellon Institute with the Society for the Promotion of Engineering Education Among those who discussed the needs of engineering and engineering education were Henry M. Howe, Bedford Hills, N. Y.; Raymond F. Bacon, director, Mellon Institute; J. B. Garner, Mellon Institute; C. S. Howe, Case School of Applied Science; J. H. James, Carnegie Institute of Technology, and J. R. Withrow, the Ohio State University, and S. R. Church, manager, research department, The Barrett Co., New York City.

The Saturday morning session was held in the Applied Science Building of the Carnegie Institute of Technology. Among the papers presented were: "Conservation of Fuel through Smoke Regulation," by J. W. Henderson, chief, Bureau of Smoke, Pittsburgh; "Housing and Sanitation," by George W. Case, professor of sanitary engineering, University of Pittsburgh, and "The Electrical Safety Work of the Bureau of Standards," by M. G. Lloyd, associate electrical engineer, Bureau of Standards, Washington, D. C.

American Association of State Highway Officials.

The war's effect on road construction was the dominant theme of the annual convention of the American Association of State Highway Officials, held in December in Richmond, Va. The use of highways for war transportation purposes; construction and maintenance of roads under war-time handicaps, and the federal aid law were some of the subjects most discussed.

G. P. Coleman, state highway commissioner of Virginia, president of the association, reviewed the work of the year. Among the most important actions taken by the association were: Recommendation to the Federal Department of Agriculture on the utilization of convict labor on federal aid road construction; help in the preparation of a census, at the request of the War Department, of road machinery and equipment, gravel pits and quarries and other road material and their location; co-operation with the Car Service Committee of the Council of National Defense in the matter of car shortage, transportation of road material and priority order No. 2.

At the afternoon session Charles M. Upham, state highway engineer of Delaware, addressed the association on the subject of car shortage, and Col. William D. Sohier read a paper on military roads.

Roy D. Chapin, vice-president of the Lincoln Highway Association, and chairman of the Highways Transport Committee, renewed the optimism of the officials by predicting the possible revocation of the famous priority order by April.

Logan Waller Page, director, Office of Public Roads and Rural Engineer-

ing, led the discussion of federal aid with a paper reviewing the first year's work under this law.

Road design, construction and maintenance of varicus types, including brick, cement, gravel, macadam and earth formed the subject of Thursday's programs.

Action was taken to request the federal authorities for a more liberal interpretation of the federal aid law so that states in arid regions where important roads are not likely to become post roads for a long time will be able to receive benefit from the law. The state highway departments of the country are to co-operate in the development of a highway war program, which will be turned over to the Highways Transportation Committee and the Priority Board so that the proper transportation of necessary materials may be provided. A committee was appointed to study the regulation of motor vehicles.

Important resolutions were passed, outlining the work of formulating the war program and urging the tremendous importance of adequate highway construction for war purposes; an intensive program of maintenance; convict labor; a campaign of education and publicity, and commending the federal aid law and the appointment of the Highways Transport Committee. The executive committee was urged to take action toward "enlarging the salability of bonds, as road improvement rests in a large measure upon the marketing of state and other municipal bonds."

It was found that thirty-eight states had paid dues last year, twenty of these holding state membership. The dues were raised from $5 to $10 a year for individuals and from $25 to $50 for state members. The following officers were elected: president, W. D. Uhler, Pennsylvania; vice-president, A. R. Hirst, Wisconsin; secretary, Major Joseph Hyde Pratt, North Carolina (absent on military service); acting secretary, A. D. Williams, West Virginia; treasurer, Frank F. Rogers, Michigan. The following form the executive committee: one year, Ira R. Browning, Utah, and Col. E. A. Stevens, New Jersey; two years, M. L. Cunningham, Oklahoma; three years, Paul D. Sargent, Maine, and W. S. Keller, Alabama; four years, Charles F. Stern, California; five years, G. F. Coleman, Virginia. There is one vacancy on the committee, which is to be filled by the executive committee. T. H. MacDonald, Iowa, and H. G. Shirley, Maryland, are hold-over members of the committee.

American Society of Civil Engineers.

An important event in the history of the American Society of Civil Engineers was the removal, on December 7, of the offices of the society from 57th street to the Engineering Societies' Building on 39th street. The officers of the national societies of mechanical, mining and electrical engineers formally welcomed the civil engineers to their new quarters for their respective societies. Dr. Ira N. Hollis spoke for the American Society of Mechanical Engineers, Dr. Rossiter W. Raymond and Adrian L. Saunders for the American Institute of Mining Engineers, and Gano Dunn for the American Institute of Electrical Engineers. George H. Pegram and Dr. George F. Swain responded for the American Society of Civil Engineers.

Nebraska State Association of Commissioners and Supervisors.

The Nebraska State Association of Commissioners and Supervisors held its twenty-third anual meeting at the Castle Hotel, Omaha, December 4, 5 and 6. P. J. Kennedy of York is president; L. R. Barlow of Lodge Pole, vice-president; C. E. Hill of Hastings, secretary, and Mike Cavey of St. Edward, treasurer. Robert E. L. Brooks of Chicago, president of the Cook County

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PERSONALS

Robinson, Charles Mulford, of Rochester, N. Y., the widely known city planning expert, died suddenly from pneumonia in Albany on December 30. Mr. Robinson held the first professorship of civic design in this country, at the University of Illinois. He prepared city plans and acted as consultant for a number of cities, including Denver, Omaha, Colorado Springs, Los Angeles, Columbus, Detroit and in Honolulu He was the first secretary of the American Civic Association, and organizer and first secretary of the National Alliance of Civic Organizations. He was also a member of the City Planning Conference. In October, 1916, he was elected honorary member of the Council for the Town Planning Institute of England, holding one of the only two American honorary memberships. Eleven years ago he was connected with "Municipal Journal" in an editorial capacity. He was author of a number of books and magazine articles on his specialty. Among the former are: "The Improvement of Towns and Cities," "Modern Civic Art," "City Planning," "The Width and Arrangement of Streets" and "The Call of the City." Mr. Robinson was graduated from the University of Rochester in 1891, and was given the degree of M. A. in 1896, the year in which he married.

Russell, L. M., city engineer of Elkhart, Ind., has resigned his position to become associated with Arthur J. Sweet, consulting engineer, Milwaukee, Wis.

Mayor-elect John Galvin, of Cincinnati, O., has announced the following appointments: John R. Holmes, director of public safety; Charles F. Hornberger, director of public service; Newbold L. Pierson, secretary to the mayor.

Mayor Allen B. Clear of Key West, Fla., has made the following appointments: Dr. William R. Warren, city health officer; W. H. Malone, city attorney; E. E. Ingraham, president of the city council; Eugene W. Russell, city auditor; Joseph Pinder, supervisor of registration; J. F. Roberts, meat inspector; Joseph W. Albury, city jailor; engineer city water works, H. C. Wetmore; sanitary inspector, Roland Richardson.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Winfield, Mo., is to build a DRAINAGE SYSTEM, plans being in course of preparation by T. N. Jacob.

STREET IMPROVEMENTS are to be made by Quincy, Fla. The plans for the work were made by the engineers, Burns & McDonnell.

CONCRETE PAVEMENT is proposed for Black River, Wis. The engineer for the improvement is W. F. Baumgartner.

Wiggins, Miss., is to improve its WATER and ELECTRIC LIGHT PLANTS. The city has retained as consulting engineer Xavier A. Kramer.

The SEWERAGE SYSTEM of Union Grove, Wis., is to be improved according to the plans of the city's consulting engineer, W. G. Kirchoffer.

The Kentawka drainage district, Neshoba county, Philadelphia, Miss., in carrying out a number of DRAINAGE PROJECTS, has the consulting engineering services of the firm of Bell & Redding.

PAVING IMPROVEMENTS to be made by Valley Falls, Kan., are being planned by the engineering firm of Black & Veatch.

A WATER SYSTEM is being installed by Bonifay, Fla. Plans and specifications were prepared by the consulting engineering firm J. B. McCrary Company.

Niagara Falls, N. Y., has decided to control its development according to a CITY PLAN. The city has retained as its consulting city planner John Nolen.

Improvements are to be made to the ELECTRIC LIGHT PLANT of Appleton City, Mo. Preliminary plans are now in process of preparation by the engineering firm of W. B. Rollins & Co.

Fremont, Neb., is to build a SEWAGE DISPOSAL PLANT. The city is having plans and specifications for the improvement prepared by the consulting engineering firm of Burns & McDonnell.

INDUSTRIAL NEWS

Cast Iron Pipe.—The trade has accepted the base prices fixed by the Government and manufacturers as fair compared with recent quotations. Judge E. H. Gary, chairman of the Committee on Steel and Steel Products of the American Iron and Steel Institute, recently gave out a statement recommending certain prices for steel and iron products as bases for price fixing and also additional extras and differentials The base for cast iron water pipe is as follows:

"Standard cast iron bell and spigot pipe, 6 inch and larger, class "B" or heavier. Per net ton of 2,000 pounds, without penalty:

$49.00 f. o. b. Birmingham, Ala.
55.35 f. o. b. New York.
54.35 f. o. b. Chicago.

The differentials are as follows:

3 in. .....$10.00 over base
4 in. ..... 3.00 over base
Class A or gas pipe 1.00 additional"

It is now expected that business conditions will improve following relief from the depressing effects of impending and delayed price fixing. Chicago prices were reduced $1.15 per ton. Quotations: Chicago, 4-inch, class B and heavier, $57.35; 6-inch, $54.35. New York, 4-inch, class B and heavier, $58.35; 6-inch, $55.35; 3-inch, $65.25. Birmingham, 4-inch, class B and heavier, $52; 6-inch, $49.

The Ransome Concrete Machinery Co., 115 Broadway, New York City, announces that the George W. Ziegler Machinery Co. has become its active representative in Pittsburgh, succeeding George W. Ziegler

The Pioneer Asphalt Co., Lawrenceville and Chicago, Ill., announces that on and after February 1, 1918, its general offices will be located at 7323 Woodlawn avenue, Chicago. The company will continue to produce its complete line of bituminous products and asphalts, including paints, pipe coatings, expansion joint, mineral rubber, insulation compound, filter, road asphalt, roofing cement, waterproofing, etc

Argentine Market for Motor Vehicles.

A report on the "Argentine Market for Motor Vehicles" has been published by the Bureau of Foreign and Domestic Commerce as Miscellaneous Series No. 62. It was prepared by David Beecroft as an appendix to the report of the party that was sent to Argentina by the Latin American Return Visit committee. It is issued by the bureau because it deals with a subject of great interest to American manufacturers who are concerned with foreign trade. The writer finds that Argentina offers greater possibilities than any other country in South America as a market for automotive vehicles. The field of the motor truck in Argentina has not been developed to any extent and the truck movement is lagging far behind the car movement. There is a good selling field for trucks in the city of Buenos Aires and a limited field for trucks in cities such as Rosario, Bahia Blanca, Mendoza and Cordoba. In the smaller cities street pavements are generally good, but wide streets are not so common as in Buenos Aires. In addition to outlining the possibilities of selling American cars and tractors, Miscellaneous Series No. 62 has practical pointers on methods of obtaining business and carrying it on successfully. Copies can be obtained at 5 cents from the superintendent of documents, Government Printing Office, Washington, D. C., or from any district or cooperative office of the bureau of foreign and domestic commerce.

The Indiana Truck Corporation, Marion, Ind., recently received a large order from the United States Government for military trucks The president of the corporation, Mr. Charles G. Barley, recently returned from an extended pleasure and business trip to California and the Northwest. Mr. Barley was the guest of Mr. J. N. Clements of the Motor Distributors Company, San Francisco, and Mr. F. W. Vogler, president of the Northwest Auto Company, Portland, Ore. Mr. Barley states that the business of the company is in a flourishing condition and that it has developed remarkably in the past two years.

Work of the Bureau of Standards.

Scientific work of unusual volume and interest is described in the annual report of the director of the Bureau of Standards, just issued. The work ranges from the testing of clinical thermometers to the publication of national electrical and gas codes. Since the war began all branches of this scientific bureau have been conducting researches on technical problems of military application. The regular work, however, has not been overlooked. In fact, the variety and importance of the results obtained during the year in its scientific and technical researches are of unusual interest.

The standardization work has comprised the making of 155,000 tests of weights, measures, measuring instruments, and materials; the promulgation of a new standard screen scale for unifying the sizes of industrial sieves; standardizing blood-counting apparatus, including new specifications based on researches on the errors of such apparatus; the standardization of master scales in 21 states and of the master scales of the American Railway Association, and a large number of special researches in physics of materials.

The report describes much interesting work on standards for electrical measurements; magnetic system of testing steels to ascertain quality for tool making, rail making, ball bearings, and the like; improved methods of light measurement; standard practice codes issued as national standards for electric service, and for gas service; work on standards for street lighting service, and on standards for telephone service; investigation of gas-mantle conditions in the leading cities; and the important work of safeguarding underground structures from the damage caused by stray electric currents.

The chemical work of the bureau included the development of new methods of analyzing steel and other materials; cooperation upon military researches involving chemistry, such as the preparation of special gases, combustion gas detectors; and chemical researches and material testing in great variety and quantity for the government.

The bureau's technologic work comprises a wide range of researches into the special technologies of the metals, cement, clay, clay products, lime, stucco, paints, roofing materials, and miscellaneous materials. The regular growth of the bureau and its special expansion on account of war work has resulted in the construction of several new laboratories and an increase in the staff of about 60 per cent.

NEWS OF THE SOCIETIES

(Continued from page 27)

Real Estate Board, delivered an address Wednesday morning on the value of the Torrens system in Nebraska. George A. Roberts, county clerk of Dawson county, followed with a discussion on what the Torrens system of registration is doing for one Nebraska county. George E. Johnson, state engineer of Nebraska, spoke in the afternoon on county highways and state aid laws. W. M. Sanders, county highway commissioner of Dodge county, discussed state and county cooperation in the matter of highways. Martin Bysong of West Point, commissioner in Cuming county, spoke on the cost of constructing county bridges.

New Jersey Sanitary Association.

The forty-third annual meeting of the New Jersey Sanitary Association was held December 15 at Lakewood, N. J.

A feature of the meeting was an address on "The Civil Surgeon and the National Army," by Major Wells P. Eagleton, Newark, attached to the base hospital at Camp Dix.

Dr. Thomas J. Headley, of the State Agricultural Experiment Station, New Brunswick, spoke on the prevention of the fly nuisance .

The changes in the personnel of officers of the association included the advancement to the presidency of first vice-president George W Fuller, of Summit, succeeding Dr. Calvin N. Kendall, state commissioner of education. Chester H. Wells of Montclair was elected third vice-president and R. B. Fitz-Randolph chosen chairman of the executive committee.